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EARLY CULTURAL HORIZONS IN THE SOUTHEASTERN UNITED STATES

CARL F. MILLER*

SINCE Haag's[1] article "Early Horizons in the Southeast" appeared some time ago, considerable data have accumulated which further delimit the southeastern archaeological area. Instead of covering the area south of the Ohio River and east of the Mississippi River, as noted by Haag, it more nearly approximates that region covered by the eastern half of the state of Tennessee; the southern half of North Carolina; all of Mississippi, Alabama, Georgia, South Carolina, and Florida; and the eastern portion of Louisiana—most of which lie in the Coastal Plain and in the northern portion of the Piedmont section. Climatic as well as physiographic and cultural conditions were determinants of the type and kind of aboriginal sites found in this geographical section of the United States.

The impetus for intensive investigation of archaeological sites in the Southeast was provided by the Works Progress Administration, acting in cooperation with local institutions and with the Tennessee Valley Authority. The beginning of World War II saw the end of this agency and a slowing up of the process of delving into American prehistory. Since the close of the war an additional stimulus has again set investigations into action, namely the building of dams across the various rivers and streams to control their actions, which has brought into play the River Basin Surveys sponsored by the Smithsonian Institution, the U. S. National Park Service, and the U. S. Engineers. This agency has cooperated with various state universities in making surveys and investigating key sites within the numerous basins to be flooded.

Largely through the activities of the W.P.A. and the River Basin Surveys, a mass of data concerning the early cultures has been accumulating, particularly with reference to the preceramic horizon and the beginning of pottery-making. It is the purpose of the present article to summarize these data.

PALEO-INDIAN REMAINS[2]

EASTERN FOLSOM

Probably the oldest cultural manifestation to be found in the Southeast is the eastern variant of the Folsom complex. Sporadic surface finds of artifacts attributed to this culture have been noted in the various collections scattered throughout the area. Kelley[3] recovered an eastern Folsom from "fossil soils" together with a

> . . . heavier concentration of rotten decayed flint scrap suggesting flint knapping sites. . . .
>
> Other projectiles from deep weathered loam show the same attentuated "Folsomoid" traits in less striking degree. The variations in fluting or longitudinal grooving, in form, and in the haft appear to be specializations peculiar to the southeastern Piedmont region, as comparable specimens occur elsewhere in Georgia in private collections.
>
> The scrapers, knives, perforators, and drills, more closely resemble western prototypes. However, several distinguishing specializations appear on the Macon Plateau.
>
> A class of broad, snub-nosed, plano-convex scrapers with shelving haft are noteworthy.
>
> Another specialized series of scrapers found only in deep weathered loam and always exhibiting heavy decomposition is represented by large, massive, round, plano-convex tools. These may be 2 inches or more in diameter and a half inch thick. The peripheral cutting edges are secondarily chipped

* Published by permission of the Secretary, Smithsonian Institution.

[1] Haag, 1942*a*.

[2] The terms "Paleo-Indian" and "Early Man" are used synonymously in this article in reference to the late Pleistocene or early Recent inhabitants of the Southeast. The groups who occupied the area more recently are called "Neo-Indians." See Griffin, 1946, pp. 40–2.

[3] Kelly, 1938, p. 7.

Several possible Folsom camp sites have been found in the Buggs Island Reservoir.[4] Fluted points typical of the eastern variety of Folsom, as well as snub-nosed scrapers and gravers comparable to some of those found at the Lindenmeier site in northern Colorado, were recovered on the surfaces of these sites, 44 Mc 72 and 44 Ch I, eroded out of the deposits. Pottery and stone artifacts of subsequent cultures were absent. Some of this material is also found associated with much later material, but does not necessarily represent a correlation.

This is not the first time that fluted points have been reported from southern Virginia. Bushnell[5] and others had previously announced findings. Recently McCary[6] has conducted a survey of the various fluted points belonging to the eastern variant of the Folsom complex which have been recovered from sites in Virginia and northern North Carolina. These points, when compared with the western or true Folsoms, are longer, with shorter fluting, and more than twice as thick. He reports 126 points coming from 28 counties in Virginia and 45 from Granville County, North Carolina. Although no great number of points was found at any site, this great concentration may well indicate the presence of Early Man in the region.

Bushnell[7] states that,

> No workshop has been discovered where the points were made. Such a workshop would be revealed by broken or unfinished pieces intermingled with the cores and spalls which would have resulted from the shaping of the blades. Nor is a specimen known to have been discovered in an undisturbed mass of sand or earth, or associated with traces of extinct fauna that would indicate or suggest its approximate age or the period to which it belonged. The points are assumed to be very old, but several facts concerning them remain unknown, namely: the identity of the people by whom they were made; the period to which they should be attributed; the cause of their wide distribution; and the actual manner in which they were used.

Sites of the Copena Focus in northern Alabama have yielded three fluted points.[8] In addition, Lewis and Kneberg[9] have placed this type in their Eva Focus, a conception which, however, is not accepted by many archaeologists (see below, Footnote 79). Such finds suggest a late survival of the points in some places.

Fluted points have also been reported from sites along the Big Kiokee Creek in eastern Georgia. During the survey of the Clark Hill Reservoir, a number of snub-nosed scrapers of a type occurring in Early Man sites in the western United States, were found on pre-pottery sites in this region.

These are not the only places where such artifacts are found. Until a definite correlation can be defined and demonstrated stratigraphically, we will have to be satisfied with surface indications.

OTHER FINDS

Remains of Early Man have been reported from Flagler Beach, Florida, by Connery,[10] who discovered artifacts lying 2.5 feet below the surface near or between the jaws of an elephant. The nature of the deposit would tend to create doubt as to the contemporaneity of the artifact and the fossil jaw.

Considerable literature has been published about a find at Vero, Florida. Three distinct geologic strata occur there, the lowermost being the Anastasia marl, a marine formation in which neither vertebrate fossils nor human relics have been found. Resting directly upon this marl is a non-marine sand layer which has been named the Melbourne bone bed. Overlying this bone bed and separated by an erosional unconformity is a deposit of sand and muck known as the Van Valkenburg beds. Human foot bones, parts of a pelvis, flint chips or spalls, and bone implements occurred in the Melbourne formation, while fragments of the skull and other parts of the same skeleton lay on the surface of the Melbourne bed, surrounded by Van Valkenburg material. Other artifacts, including pottery, were found higher up in the Van Valkenburg beds.

Sellards[11] has collected a number of extinct animal remains from the Melbourne formation, which have been identified as *Megalonyx jeffersonii* (Desmarest), *Chlamytherium septentrionalis* (Leidy), *Dasypus* sp., *Equus leidyi* Hay, *E. complicatus* (Leidy), *Tapirus veroensis* (Sellards), *Camelops* (?) sp., *Mastodon americanus* (Kerr), *Parelephas columbi* (Falconer), *Aenocyon ayersi* (Sellards), and *Smilodon*

[4] Miller, 1947, pp. 28–9.
[5] Bushnell, 1940, pp. 145–6.
[6] McCary, 1947.
[7] Bushnell, *op. cit.*
[8] Webb and DeJarnette, 1942.
[9] Lewis and Kneberg, 1947.
[10] Connery, 1932.
[11] Sellards, 1916.

(*Trurifelis*) *floridans* (Leidy). The foot bones, parts of the pelvis, and artifacts which were found beneath the erosional unconformity lay among these extinct animal remains.

The Melbourne formation itself is named after three sites near Melbourne, Florida, where there is the same sequence of three strata as at Vero. These Melbourne sites were discovered later, in 1923 and 1925. At the first to be investigated, on the Singleton estate, artifacts and charcoal were found in the Melbourne formation associated with extinct animals.[12] At the second site, on the Melbourne Golf Course, a crushed human skull and a number of other bones were encountered within a few inches of the top of the sand stratum of the Melbourne formation. Essentially these lay at the contact of the Melbourne formation with the overlying Van Valkenburg beds and hence may possibly belong to the period of erosion subsequent to the deposition of the Melbourne formation. Other skeletal material and artifacts, including pottery, occurred at or near the line of contact between the two layers in one or another of the three sites.[13]

According to Gidley and Loomis[14] the vertebrate fossils recovered from the bone bed at Melbourne are very much the same as those found at Vero, Florida. The two human crania and the artifacts are also alike.

Hrdlička reconstructed the Vero and Melbourne skulls, and concluded from his reconstructions that both are essentially modern in type.[15] This conclusion has recently been questioned by Stewart, who, having examined first the Melbourne and then the Vero skull (which he obtained from the Florida Geological Survey), decided that they were badly put together and made new reconstructions. He then compared the two reconstructions with each other and with a recently discovered dolichocranic skull from Pensacola Bay and found all three skulls to be remarkably similar in shape; all have about the same degree of dolichocrany and about the same fronto-parietal relationships. The only difference noted was that the Vero skull varied from the other two in its relatively low vault and thin wall.

Stewart[16] states:

> In the foregoing sections, I have attempted to show that: 1, the first reconstruction of the Melbourne skull (by Hrdlička) is unbelievably bad from every point of view; 2, that the second reconstruction is anatomically convincing; and 3, that as now reconstructed the Melbourne skull is surprisingly similar in form to the Vero skull, which was was found under like circumstances. I have shown, moreover, that the fragmentary nature of the Melbourne skull makes it impossible to determine its original form with complete accuracy. Nevertheless, the new version must approximate the original form because it depends upon careful matching of the fragments and not upon a preconceived notion of what the form was. . . .
>
> The similarity of form between the Vero skull and the new version of the Melbourne skull means that the latter, too, is a stranger in Florida. And both of these strangers were found 40 miles apart and in [*on* in the case of the Vero skull] a geological stratum containing mastodon and mammoth remains. This can hardly be a coincidence. . . .
>
> It should be clear from the foregoing discussion that the Melbourne and Vero skulls, instead of being like the majority of recent Florida Indians, are rather like their more long-headed neighbors to the North and therefore consistent with what little we know of the earlier American types. . . .
>
> Thus, if we are correct in our conception of man's physical development at the close of the Ice Age—that he was relatively long-headed and of modern form—there is no reason from the viewpoint of morphology for denying such antiquity to the Melbourne and Vero remains.

Sellards[17] at the present time attributes the Melbourne formation to the Pleistocene and the Van Valkenburg to the Recent. Rouse[18] reports that the flint and bone artifacts obtained from the Melbourne formation resemble those from the Van Valkenburg beds and that both are identical with artifacts occurring in the modern preceramic, fiber-tempered, and chalky-ware sites of the vicinity. Hence, they provide a tie-in with these cultures.

F. S. Holmes is said to have found Paleo-Indian bones, artifacts, and a few potsherds on the banks of the Ashley River about 10 miles upstream from Charleston, South Carolina.[19] Detailed information regarding their occurrence and the geological conditions are not stated and the disposition of the remains is unknown.

NEO-INDIAN REMAINS

PRECERAMIC–CERAMIC SEQUENCE

In the present state of our knowledge, it appears that there was a gap between the time

[12] Loomis, 1924.
[13] Gidley and Loomis, 1926
[14] Gidley and Loomis, *op. cit.*
[15] Hrdlička, 1918, pp. 55–7.
[16] Stewart, 1946, pp. 19, 20, 22.
[17] Sellards, 1947.
[18] Rouse, n. d.
[19] Hrdlička, 1907, p. 20.

when the Paleo-Indians roamed the country and the later infiltration of another lithic culture group, Neo-Indians, whose remains are to be found in numerous workshops and pre-pottery sites scattered over the area. Stone artifacts from such sites are badly eroded, or patinated, all the facies and edges of the objects having been smoothed and worn down so that an "oldish-look" is very apparent. Studies to determine how long it takes an object fashioned from the various types of rock to acquire such characteristics have come to no fruitful end. The various ground acids have apparently combined with sun and weather action to bring about the changes.

As we approach the later lithic horizon we are on much more familiar ground. We know that there occurred a definite sequence of occupations, commencing about the beginning of the Christian era on a non-ceramic level. The original sites were occupied almost continuously until about A.D. 500, when the art of pottery-making was introduced into the area. A majority of the sites are shell middens located along rivers, marshes, or the seashore, some being rather extensive and others small and shallow.

John Lederer[20] was the first to mention this horizon, although without referring to shell middens. He states:

> The Indians now seated in these parts are not of those which the English removed from Virginia, but a people driven by an enemy from the Northwest, and invited to sit down here by an oracle about four hundred years since, as they pretended; for the ancient inhabitants of Virginia were far more rude and barbourous, feeding only upon raw flesh and fish until these taught them to plant corn, and shewed them the use of it.

Shell middens are widespread, not only in the southeastern part of the United States but also wherever shellfish abound. John and William Bartram[21] made notes of a number while traveling in the Carolinas, Georgia, and Florida during the late 1700's, although of course, they did not recognize that some were associated with the aborigines and in a number of instances they mistook them for natural deposits of shells.

Most shell middens, or mounds, are situated on the banks of rivers, perched on either sand or mud ridges or on slight elevations. Some have been noted near the confluences of rivers and creeks or marshes, often, as in the case of certain sites in Florida, near where lakes empty into streams. These places gave ready access to good fishing and hunting grounds. Nearly all the middens are rather sharply defined, in that shells are not found scattered very far from their bases.

While investigating shell mounds on the St. Johns River in Florida, Wyman[22] observed that "in some, as at Huntoon Island, on the creek of the same name, at Osceola mound, Horse-landing, and the mound near and above Blue Spring, [artifacts] are found in very small numbers, pottery not being present at all." Moore[23] also reported that many of the St. Johns shell heaps lacked pottery, as well as fragments of stone vessels.

Due credit must be rendered Wyman as the first to differentiate between the non-pottery and pottery-bearing levels within the shell middens and to conclude that the former were earlier than the latter. Moore further demonstrated this fact during his St. Johns investigations; he noted that in some middens pottery was found only on the surface and in the uppermost levels of the deposit. On the basis of his material Holmes[24] was able to distinguish two ceramic periods, an earlier one, coming immediately after the preceramic horizon, which was characterized by fiber-tempered pottery, and a later one in which there was a chalky ware.

A succession of preceramic and ceramic occupations can also be demonstrated for the shell heaps of northern Alabama. Here, J. B. Griffin[25] and Haag[26] have been able to establish a sequence within the ceramic levels based upon the types of tempering material used. The first ceramic period is again characterized by fiber tempering and the later periods, by the use of non-vegetable materials (see below, pp. 282–5).

A comparable sequence is represented in the large shell deposit on Stalling's Island in the Savannah River, eight miles above Augusta, Georgia. Stalling's Island is largely covered by a midden of mussel and other shells. It was first described by C. C. Jones, Jr.[27] as being roughly

[20] Lederer, 1672.
[21] J. Bartram, 1942; W. Bartram, 1943.
[22] Wyman, 1875, p. 12.
[23] Moore, 1892–94.
[24] Holmes, 1894, pp. 113, 128.
[25] J. B. Griffin, 1938.
[26] Haag, 1942*b*.
[27] Jones, 1873.

320 feet long and about 50 feet high. During his testing, Jones found a number of human burials, fragments of pottery, and implements and ornaments of animal bone, stone, and shell.

In 1929, Mr. and Mrs. C. B. Cosgrove, of the Peabody Museum of Harvard University staff, carried on extensive excavations in the site. The results of their exacvations and a few sporadic "digs" conducted by Claflin were incorporated into the final report.[28] Claflin assigned the name "Stalling's Island Culture" to the assemblage of material recovered. This formulation was confirmed by Fairbanks,[29] who further tested the site and compiled a taxonomic list of traits.

It was evident that the people who built the Stallings Island midden did not use pottery until relatively late in their history. The potsherds directly connected with their culture are all fiber-tempered. In addition, the site yielded sand-tempered sherds from intrusive pits, which have been recognized as belonging to later cultures than the basic deposits and the undisturbed pottery-making levels. This gives some inkling as to the relative chronological position of the Stalling's Island culture.

The Bilbo site, excavated by Dr. A. J. Waring, Jr.,[30] is located in a slough near the mouth of the Savannah River. Here an assemblage of artifacts was found which very closely approximated that at the Stalling's Island site. Bilbo, however, is much smaller and no burials were found during the excavation. Caldwell[31] noted that,

> While Stallings has some cultural traits which Bilbo does not have, Bilbo possesses hardly any which are not also found at Stallings. At the base of the Bilbo deposit was a shell layer which contained no artifacts at all, possibly a pre-pottery level. Examination of the strata above suggested that the culture had undergone changes with the passage of time; decorated pottery gradually increased at the expense of the plain pottery and there were apparent modifications in the types of bone pins and stone projectile points. The topmost layer, which included the humus zone and several intrusive pits, contained paddle stamped pottery of a subsequent [Deptford] period.

The Lake Spring site, located about 22 miles up the Savannah River from Augusta, in Columbia County, Georgia, belongs to this same complex.[32] Here a definite non-ceramic level comprised the major portion of the deposit with a relatively thin overburden containing fiber-tempered sherds. Intrusive into the original deposit were a number of pits from which sand-tempered sherds of the stamped variety were recovered. In checking the traits found at Lake Spring site against those already noted for Stalling's Island, it was found that there is a direct correlation, leading to the conclusion that the same culture is represented. This may be called the Savannah River Focus, Stalling's Island Aspect, of the Archaic Pattern.[33]

As we have already pointed out, the use of pottery and its introduction began late in the history of the Savannah River people. There is no evidence that this new trait brought about any appreciable change in the mode of living or in the rest of their material culture. The pottery was very crude in nature and simple in form. It was tempered with fibers, modeled rather than fashioned by the more usual coiling process, only roughly smoothed, and occasionally decorated with punctations and incision, which characterize the ware. The only form used was the simple bowl.

The subsequent pottery differed greatly. It was built up by means of the coiled technique; the number of shapes increased in variety; and the mode and technique of decoration bore very little connection to earlier techniques. The Deptford pottery complex, or horizon, directly follows (as far as is known at the present time) the Stalling's Island horizon in coastal Georgia, but there is apparently a considerable gap between the two. (Waring, however, reported verbally that he has excavated a site which shows a gradual gradation from the Stalling's Island into the Deptford without any breaks or gaps.) The gross differences between the fiber-tempering, modeled-construction, simple bowl forms, and incised and punctated decoration of Stalling's Island and the sand-tempering, coiled construction, varied vessel forms, and stamped decoration of Deptford are far greater than between any other successive complexes in the Southeast.

We know very little about the people of the Savannah River Focus. We know nothing about their house types, their clothing—if they wore

[28] Claflin, 1931.
[29] Fairbanks, 1947.
[30] Waring, n. d.
[31] Caldwell, n.d.
[32] Miller, 1949.

[33] The term "Archaic" is used here despite the fact that the pattern is not really archaic. As Griffin (1946) has pointed out, "most of the preceramic units now recognized in the eastern United States are relatively late in the preceramic cultural development of the country as a whole."

anything at all—their religion, or their social structure. These people did not intentionally build mounds of any kind and the reference to their places of habitation as "mounds" is misleading; they are ordinary middens or garbage dumps. It is true that fire-basins and burned areas are found within the middens, but neither post-mold patterns nor household material have been found in direct association with the sites.

Whether the people who made fiber-tempered pottery knew anything about agriculture cannot be stated. Claflin[34] noted that a number of charred corn cobs were found cached away in two pits, "giving proof that this grain was in use. The ears are small, scarcely any of them reaching a length of 3 inches." These, however, were probably associated with the later, intrusive occupation.

Kelly similarly calls attention to a situation which he considered as identifying agriculture on an early horizon. He states[35] that "cache pits, presumably for the storage of maize have been found in the oldest submound occupation levels at Macon." The validity of this statement is doubtful.

On the whole, it would be prudent not to attribute agriculture to either the preceramic or fiber-tempered people until much more work has been done on this horizon. Lederer, as pointed out above, stated in 1672 that the early inhabitants were ignorant of agriculture until it was taught them by a later influx of people.

FIBER-TEMPERED POTTERY

We have seen that the earliest pottery in the Southeast was fiber tempered and that this pottery occurred in three major basins, the St. Johns, the Tennessee, and the Savannah. Each of these basins may be considered a major center for the pottery.

A perusal of the literature dealing with early sites indicates that fiber-tempered pottery is not wholly confined to the Southeast. Speaking of the Southwest Basket Maker III culture, Morris[36] says:

> The earliest occupants of the region of whom traces have been found had no containers of clay whatever, but used a great deal of mud reinforced with vegetable fiber in the construction of their dwellings and storage bins. Somewhat later they augmented their range of domestic utensils with vessels [most of them] made of exactly the same sort of reinforced mud, [usually] shaped by moulding in coiled baskets. Later still, they produced fiber-tempered vessels without the use of moulds and began to replace the vegetable reinforcement with sand. Evidently in association with unburned vessels in dwellings identically like the earlier ones, and constructed by a people a considerable proportion of whom had a skull form apparently the same as that of the stock which had baskets only, true sand-tempered pottery makes its first appearance . . . .
>
> As time passed, better workmanship was achieved. The range of form was amplified, and fired-in ornamentation spread to all forms of vessel except cooking pots. By the end of the Post Basket Maker period, all types of San Juan pottery indigenous in the area under consideration, had passed their point of origin.

This can almost be duplicated in the Southeast, with the exception that the earliest types were not moulded inside baskets nor does their type of decoration approximate that found on basketry. The earliest decorative types found in the region under discussion are more like those on stone vessels.

Strong[37] reports that presumably the earliest pottery found in Nebraska is a "hole tempered ware," in which, apparently, a vegetal temp[er] was used and burned out. This ware deviates from that found in other early pottery-bearing sites in that a "very fine white sand" was also used as a tempering medium along with the vegetal material. Its other general physical characteristics conform very closely to the true fiber-tempered ware of the Southeast.

While investigating the archaeology of the St. Lawrence Island in Alaska Collins[38] noted that:

> Fine grass was also used for tempering. The small grooves left by the grass stems and even the carbonized stems themselves are plainly visible on sherds which have weathered or flaked off. . . . Microscopic examination shows plainly that it was grass. The sherds with grass tempering were appreciably lighter in weight than those in which sand and gravel had been used, and they show a more pronounced tendency to flake off in layers. I found no instance in which both methods of tempering had been used in the same vessel.

This flaking tendency is noticeable in the sherds found at Lake Spring site, in western Georgia. It is fairly true of all other vegetable-tempered pottery.

In his study of the "Aboriginal Pottery of the Eastern United States" Holmes[39] wrote that "much of the shell deposit ware has been

[34] Claflin, 1931.
[35] Kelly, 1938, p. 61.
[36] Morris, 1927, p. 198.
[37] Strong, 1935.
[38] Collins, 1937.
[39] Holmes, 1903.

tempered with fibrous vegetal matter, such as pounded grass or bark, thought by Wyman to be palmetto fiber, which burned out in firing or has disappeared through decay, leaving the paste light and porous." Fewkes[40] and Caldwell and McCann[41] have put forth the idea that the fiber in the Georgia pottery was possibly that of Spanish moss. This, I think, is the more likely answer.

As already noted (pp. 277–8), Stalling's Island near Augusta, Georgia is a classic site for fiber-tempered pottery. Similar material has also been excavated further up the Savannah River at Lake Spring and downstream at Bilbo.

In his study of the Savannah River cultures Caldwell[42] states:

> Other Savannah River Focus sites are found at the mouth of the Savannah River near the Bilbo shell heap. The pottery is similar to that found at Stalling's Island and Bilbo. Excavations have been limited and few non-ceramic artifacts are reported although there is a high correspondence in type among those which do occur. The Maldrim site consisted of a fringe of low shell heaps on the shore of Wilmington Island near Savannah, Georgia. Two test pits ·lded nothing but pottery and the Stalling's Island-like ·ds were mixed with later types (Deptford and Wilming-). The Oemler Marsh middens were two horseshoe- ..aped deposits of considerable size in tidal swamp a few hundred feet from the shore of Wilmington Island. A small excavation in one of them revealed no materials other than pottery which was all similar to the Stalling's Island and Bilbo types. It has been suggested that these horseshoe-shaped sherd deposits may once have surrounded pile dwellings. A site at the upper end of Ossabow Island, which was not visited by the writer, is represented in the National Museum by a collection of sherds. . . .
>
> Southward along the Georgia coast at Valona in McIntosh County many large Stalling's-like sherds have been found washing out on the beach.

Holder,[43] in his diggings in the vicinity of St. Simon's Island, along the coast of Georgia, found a number of fiber-tempered sherds along with later sherds, but the actual percentage of fiber-tempered sherds was almost negligible (a total of 178 sherds or 0.0084 per cent).

Sir Charles Lyell[44] made a note of large shell heaps on St. Simon's Island near the mouth of of the Altamaha River, Georgia. He stated that these heaps covered about 10 acres with an elevation ranging from 5 to 10 feet.

In his Macon report Kelly[45] noted a number of fiber-tempered sherds in association with Early Swift Creek types at the One Mile Tract site. Others were found beneath Mound D of the Macon site, where they had "a vermiculated surface finish, which generally denotes an Early Swift Creek horizon in central Georgia," and gave "percentages increasing toward the bottom levels."[46]

In the upper building levels of Mounds A and B at Macon, the pottery tended to be tempered with a mixture of shell, vegetal matter, and grit. This mixture should not be confused with the earlier fiber-tempered wares, as the earlier people did not include such a mixture of tempering with their clay. Besides, as noted before, these people were not mound-builders.

Kelly[47] called both wares St. Simons Fiber-tempered Plain, referring to the exploratory work of Holder on St. Simon's Island in 1936. Since Claflin's publication, "Stalling's Island Mound," predated Holder's work and, since St. Simon's Fiber-tempered Plain incorporates a mixture of tempers, we think that Claflin's work should carry precedence over Kelly's designation even though the two wares are not entirely the same. The plain ware, as found at Stalling's Island and Lake Spring sites, will be referred to as "Stalling's Island Plain" in this paper.

We have seen that Stalling's Island Plain and Punctated were the first pottery types in this area. Incision was used but sparingly. The vessels consisted of simple bowls, mainly with rounded or flattened lips.

The fiber-tempered pottery complex cannot be attributed at the present time to the Etowah drainage of northwest Georgia, for Wauchope[48] reports that it is rare there in comparison to the coastal and Piedmont regions of the state. However, its occurrence in adjacent Tennessee[49] suggests that it may eventually be found more commonly in northwest Georgia.

Flannery's[50] and Griffin's[51] short reports on the shell midden sites near Beaufort, South Carolina give us some information regarding

[40] Fewkes, 1939.
[41] Caldwell and McCann, 1941.
[42] Caldwell, n.d.
[43] Holder, n. d.
[44] Lyell, 1894.
[45] Kelly, 1938, p. 32.
[46] Kelly, 1938, p. 36.
[47] Kelly, 1938, p. 60.
[48] Wauchope, 1948.
[49] Lewis and Kneberg, 1947.
[50] Flannery, 1943.
[51] J. B. Griffin, 1943.

the cultures there. Very few artifacts except potsherds were found.

The Chester Field site is a horseshoe-shaped mound, the ends of which adjoin the steep, overgrown bank of the Broad River. It is not known whether the mound was circular at one time or not. In testing the area, a fire pit was found filled with debris, as well as a compact shell deposit 12 inches thick containing sherds, worked antler prongs, several chipped flints and flakes, one-half of a round pitted stone, and some animal bones. The mound is composed of cast-off oyster and other shells and irregular layers of dark earth. There were occasional pockets of periwinkle shells.

This site is important in that it belongs to the Stalling's Island complex. Besides fiber-tempered pottery, net-sinkers of the type associated with this pottery were recovered from the debris of the site.

The site at Lake Plantation appears to have been pretty badly stirred up, as the earth had been disturbed in places to a depth of 6 feet. No true ash pits and no suggestion of hearths or fireplaces were found with the exception of one spot "where the clay was rather hard and burned to a depth of 3 feet below the surface."

A complete ceramic complex was found at this site, but with relatively few fiber-tempered sherds—only six in all. Four of these are Stalling's Island Plain and the remaining two are Stalling's Island Punctate.

Thom's Creek site,[52] located 6 miles south of Columbus, South Carolina, is on the south side of the Congaree between the river and the old state road running from Columbus to Charleston. In his analysis of the pottery from this site, Griffin stated that "all . . . can be said to belong to the early Woodland pottery tradition in the Southeast, except the complicated stamped and some of the plain-surfaced specimens, which form a minority of the total recovered. The latter belong to a protohistorical and early historical period in the Georgia-South Carolina area. . . ."

Only one true Stalling's Island Plain sherd was found, but there is a possibility that others of this type could be recovered if the site was excavated. The rest of the pottery is sand-tempered. Some of the decorative elements and treatment are similar to those of the Stalling's Island complex and suggest a period of transition between fiber-tempered ceramics and the wares encountered in the subsequent period (Deptford). Most of the pottery, however, is more closely related to Deptford than to Stalling's Island. As Griffin states, "the majority of the pottery from the Thom's Creek site very clearly belongs to the Deptford complex, which can be considered an early Woodland manifestation in the Southeast."

Coe[53] has reported the finding of Thom's Creek Punctate at a few sites in Brunswick County, southeastern North Carolina. These were all surface finds.

In addition, he reports digging an early site in Montgomery County, North Carolina, with 11 feet of stratified deposit, where pottery occurs only in the upper levels. The topmost non-ceramic level is comparable to the Savannah River Focus, best exemplified by the Stalling's Island site. Beneath this stratum is another non-ceramic level, which he designates as the Guilford Focus. Separating the Guilford Focus material and a lower non-ceramic deposit are two sterile strata, the uppermost being a humus layer which overlies a sterile sand stratum, which in turn lies over the lowermost non-ceramic layer. In this lowermost deposit were recovered a number of points comparable to Pinto Basin and Gypsum Cave types, together with a long slender point which may be an eastern Yuma variant.

Turning our investigations to Florida, we may note that Jeffries Wyman's monograph on the "Fresh-water Shell Mounds of the St. John's River Florida"[54] is one of the outstanding contributions to the study of fiber-tempered pottery. Wyman's pottery was tempered with "palmetto-fibre" and decorated with "tracings of straight lines; but few of the pieces were stamped." Such ware was found at Old Enterprise, Huntoon Island, Old Town, Watson's Landing, at Silver Springs on Lake George, and Palatka. To cover up the unfinished vermiculated surface a wash or "skimming" was added which obliterated this feature.

Wyman's discoveries were substantiated by Moore[55] during his investigations along the St. John's River. Holmes[56] describes the pottery which Moore secured from his diggings as follows:

[52] J. B. Griffin, 1945.

[53] Coe, personal communication.

[54] Wyman, 1875.

[55] Moore, 1892–94.

[56] Holmes, 1903.

One variety exhibits a rather fine-grained paste preserving the warm gray colors of the baked clay. The surfaces were finished with a rubbing tool, and are plain or have been rather carelessly embellished with patterns in straight or curved incised lines. Another, and the most noteworthy variety, is characterized by the unusual appearance of the paste, which has been tempered with a large percentage of fibrous matter, probably shredded palmetto fiber. This tempering substance has been destroyed by fire or decay, leaving the paste highly vesicular and porous and of low specific gravity. . . . The walls are thick and uneven and the surfaces are rudely rubbed down. The forms appear to have consisted mainly of bowls with rims variously recurved, incurved, and otherwise modified, and with rounded or flattish bases. . . . They are from the Tick Island mound, and appear typical of what is assumed to be the earliest pottery-making period. The execution of the design is decidedly rude, the incised lines being deep, wide and irregular.

Griffin[57] has named the St. Johns fiber-tempered ware the "Orange" series and has defined two types, Orange Plain and Orange Incised. In the Melbourne region, according to Goggin,[58] Orange pottery "is best represented along the St. John's especially at South Indian Field, but small sites on the ocean indicate a minor occupation of the littoral. In addition to the distinctive pottery, numerous steatite vessel sherds were found at South Indian Field. Other artifacts assignable to this culture include Strombus shell celts, chipped flint points, and polished bone ornamental pins. There seems to be the possibility that dogs were prized for food and apparently were raised for 'eating.'"

Orange Incised pottery is followed in the stratigraphic sequence at South Indian Field by St. Johns Incised, a chalky ware decorated with similar designs.[59] St. Johns Incised is in turn related to Tchefuncte Incised, Lake Borgne Incised, and Alexander Incised, a series of types which are found in the western part of the Southeast and also lack fiber tempering; they are tempered with sand and clay-grit. James B. Griffin[60] has pointed out the possibility that the Tchefuncte wares were subject to influence from the St. Johns and Stalling's Island fiber-tempered centers, but to date this cannot be demonstrated.

John W. Griffin[61] has reported finding fiber-tempered pottery and steatite bowls at the Cotten site in the southern St. Johns area. He comments that it dates "from the earliest known pottery horizon in the eastern United States."

From Dade County, southern Florida, Goggin[62] has reported a pottery having " . . . a very fine fiber temper, or else burnt out holes. This temper is so very fine, that the fiber must have been of a type that could be crushed, when dry, to form a dust. This fiber is probably intentional tempering and not accidental inclusion. This is the best fired ware in the area. . . . " In subsequent reports,[63] Goggin makes no further reference to this temper, and it is assumed that he has changed his mind about it. The pottery is actually like the chalky ware of the St. Johns and has been named the Biscayne series; it is accompanied by a gritty ware, which is known as the Glades series.[64]

Stirling[65] has reported a fiber-tempered pottery from the central west coast of Florida occurring in a historic mound, but the decoration does not resemble those previously mentioned. He calls a similar pottery from the same site "untempered muck ware." Possibly he is discussing an entirely different ware.

From the Perico midden in the same region, Willey[66] mentions 15 fiber-tempered sherds, which are identical to Stalling's Island Plain, as found in the Savannah River drainage, and also bear a very close resemblance to the Orange pottery of the Melbourne district. Since there is no evidence of stratigraphy in the Perico shell midden as excavated, the chronological position of the Perico series relative to Glades pottery, which was predominant in the midden, cannot definitely be established: "Whether the fiber-tempered ware preceded the sand-tempered Glades types or was contemporaneous with their early beginnings is a future problem for stratigraphic study in the Manatee region."[67]

In a recent communication to Willey, Waring[68] has reported the presence of a midden site on a marshy island at the mouth of Chassahowitzka River, Hernando County, Florida. Investigations showed that the upper stratum was composed primarily of oyster shells and

[57] J. B. Griffin, 1945.
[58] Goggin, 1947.
[59] Rouse, n. d.
[60] J. B. Griffin, 1945.
[61] J. W. Griffin, 1947.
[62] Goggin, 1939.
[63] Goggin, 1947.
[64] Goggin and Sommer, 1949, pp. 33–46.
[65] Stirling, 1935.
[66] Willey, 1948, p. 215.
[67] Willey, 1948, p. 216.
[68] Waring, letter dated August 18, 1947.

salt water mollusks with a scattering of potsherds, principally of the Weeden Island period. At a 2.5-foot depth he encountered a lower stratum composed of fresh-water gastropods, fine fish bones, and ash which had consolidated into a hard rock-like mass. Imbedded in this mass were a number of flint types, but no pottery. These flints consist of scrapers; large, crude hand axes measuring 10 to 12 inches in length; large hand choppers; and fragments of large, ovate blades and knives. What points were found, if any, are not described. A longitudinally grooved stone plummet is also said to have come from the lower stratum. In south Florida, this type usually occurs in the Glades III horizon, but it is unknown in later periods of the Gulf Coast. It would appear from Waring's find that the Chassahowitzka River site is the first pre-pottery station to be reported from the Gulf Coast of Florida.

However, more recent excavations at the same site by R. P. Bullen, of the Florida Park Service, has cast doubt upon Waring's interpretation. Bullen reports finding sherds in the lower zone, attributed by Waring to the preceramic horizon. Large, coarse, scraper-like blades were closely associated with pottery in the freshwater deposits and sherds also recurred at substantial depths beneath the concentration of these artifacts. This lowest level is reportedly made up of "black dirt and oyster shells, but no snail shells." Further investigations must be made into the Chassahowitzka River site to determine the true nature of the deposit.

From northwest Florida, Willey and Woodbury[69] obtained a number of sherds of fiber-tempered ware in Deptford levels. These sherds presumably show a relation to other late fiber-tempered cultures. Goggin[70] has noted that additional fiber-tempered sherds from a site near St. Marks, which are now in the Yale Peabody Museum, support this assumption.

Collins,[71] during his archaeological work in Louisiana, investigated a portion of the aboriginal cemetery on the property of John Copell, on Pecan Island in the southern part of the state. Here he noted the absence of pottery and concluded that either this trait was not one used with burials or else pottery was lacking from the culture. All that can definitely be demonstrated is that no pottery existed on the site; artifacts were found associated with flexed burials but they were non-ceramic. Some of the burials were placed on layers of red and yellow pigment. Collins' study of a number of male and female crania showed them to be undeformed and dolichocranic in type, with no evidence of syphilis. He suggests that these peoples should be regarded as the southernmost representatives of a once widespread type east of the Mississippi (Neumann's Sylvid type), which has been found in early horizons in northern Alabama, Tennessee, Kentucky, and in the Northwest.

A comparison of Copell traits with Tchefuncte sites, Chiggerville, Indian Knoll, Ward site, Kirkland site, Ct 17, Stalling's Island, Lamoka, Veazey Place on Pecan Island, and Crooks site is given in Table 39. In addition, we may note that the following Tchefuncte traits were absent from Copell:

Poverty Point clay objects
Pipes
Plummets
Socketed antler points with lateral perforations
Antler drifts
Shell chisels (unique)
Ulna and antler flakers
Bone fish hooks
Alligator bone points (unique)
Circular shell gorgets (unique)
Sandstone saws (unique)
Conical mounds
Quartz crystals
Grave goods absent
Marksville-like pottery
Grinding stones[72]

These lists indicate that Copell was no more closely related to Tchefuncte than to the non-ceramic sites elsewhere in the Southeast, and to this extent they substantiate the theory that Copell is earlier than Tchefuncte.

Tchefuncte culture itself is believed to be later than the horizon under consideration, since it yielded only five fiber-tempered sherds.[73] All were from the Little Woods site, which is probably among the earliest, since it contains midden burials rather than mounds.

A number of early sites were noted in the Pickwick Basin report by Webb and De Jarnette.[74] Twenty-three fiber-tempered sherds were recovered from the first- and second-foot

[69] Willey and Woodbury, 1940.
[70] Goggin, 1939.
[71] Collins, 1927, 1941.
[72] The above trait list was compiled by Henry Collins.
[73] Ford and Quimby, 1945, p. 56.
[74] Webb and De Jarnette, 1942.

TABLE 39. DISTRIBUTION OF TRAITS OF THE COPELL SITE*

	Tchefuncte Sites	*Chiggerville*	*Indian Knoll*	*Ward Site*	*Kirkland Site*	*Cr 17*	*Lu 86 and Town Creek*	*Stalling's Island*	*Lamoka*	*Veasey Place*	*Crooks Site*
Grave goods present		X	X	X	X	X	X	X		X	X
Atlatl weights, boat stones	X	X						X			X
Atlatl weights, rectangular bars	X	X	X	X				X			
Socketed antler projectile points	X	X	X	X	X			X			
Socketed bone projectile points	X							X			
Atlatl hooks	X	X	X	X		X	X	X			
Ulna awls	X	X		X		X	X	X	X		X
Perforated canine teeth	X	X	X	X					X	X	
Cut animal jaws and teeth	X									X	
Perforated penis bones	X									X	
Penis bone awls		X	X	X							
Unworked penis bones	X									X	
Turtle shells or worked pieces with burials	X	X	X	X		X			X		
Rodent's jaws with burials			X	X					X		
Conch shell vessels	X		X				X	X			X
Large tubular shell beads		X	X	X	X	X		X	X	X	
Inner whorls of conch shells	X										X?
Drum fish teeth											
Use of asphaltum			X							X	
Use of red or yellow ocher		X	X	X?			X		X	X	X
Mussel shells in graves		X	X	X			X				X
Total	13	12	13	12	3	5	6	9	6	8	7

* Compiled by Henry Collins.

evels at Smithsonia Landing. All of the pottery from the Perry site occurred in practically the top two feet of the midden with two-thirds of the total amount in the upper one-foot level. Fiber-tempered ware occurred at the greatest depth, which would indicate that this was the earliest type to appear at the site. Drilled rim sherds were very prevalent. This trait sometimes occurs on sand-tempered ware.

Forty-nine and six-tenths per cent of all the sherds from Bluff Creek site, Lu°29, were fiber-tempered, and were listed as the earliest type to appear at this site, occurring at a depth of 6 feet. Here can be demonstrated the beginning of the use of this type of pottery and its general growth and decline, as it was superseded by other types. Webb and De Jarnette state:

> It is interesting to note here that the decorative designs found at this site follow definitely the temper with which they are always found associated in sites of this basin. There are no "cross-overs" of design and temper. This seems to indicate that each temper type is a "pure" ware. . . . The absence of "cross-overs" would seem to indicate that each type of ware found here had its own separate development in perhaps its native habitat and that the pottery complex at this site represents a development of fiber-tempered ware over a long period.

A number of fiber-tempered sherds were found in the lower reaches of the Whitsburg Bridge site, but in so few numbers as to be insignificant. Primarily, however, this was a later, limestone-tempered site.

In the Long Branch site, Lu°67, pottery occurred to a depth of 3 feet. Of the 991 sherds, one-seventh were found below the 2-foot level. In other words 99.3 per cent of all the pottery was found in the upper 2 feet of the deposit. Only 5.25 per cent were fiber tempered. Like all other fiber-tempered wares these were crude in manufacture, having simple lips and either rounded or flattened bottoms. Decoration, too, was very simple, consisting of a series of haphazard markings or malleations with no attempt to produce a recognizable design.

	GEORGIA			SOUTH CAROLINA	NORTH CAROLINA	FLORIDA		
	CENTRAL REGION	COASTAL REGION	NORTHWEST REGION	SOUTH CENTRAL REGION	SOUTHERN REGION	NORTHERN ST. JOHNS REGION	MELBOURNE REGION	GLADES AREA
A.D. 800	DEPTFORD	DEPTFORD	DEPTFORD	DEPTFORD MYRTLE BEACH		ST. JOHNS Ia, EARLY	MALABAR I, EARLY	GLADES I
700								
600	FIBER-TEMPERED	FIBER-TEMPERED	FIBER-TEMPERED?	THOMS CREEK FIBER-TEMPERED?	THOMS CREEK FIBER-TEMPERED?	ORANGE	ORANGE	
500								
400	NON-CERAMIC	NON-CERAMIC		NON-CERAMIC	NON-CERAMIC	NON-CERAMIC	NON-CERAMIC?	

FIG. 87. Early cultur

At Union Hollow site, Lu°72, 281 sherds were picked up from the surface. Of this number only 7 were fiber tempered. From an exploratory trench 276 sherds were recovered, of which only 39 were fiber tempered. Hence, 46 of 557 sherds were of this early type, or 8.7 per cent of the total.

Pottery was limited at the Mulberry Creek site to the upper 3 feet of the deposit. Of the 2,470 sherds found, only 36, or 1.5 per cent, were fiber tempered. It has been stated that these were recovered from the upper portions of the pottery zone; evidently they were not native to the site.

A number of other sites within the Pickwick Basin have yielded a few fiber-tempered sherds, but they are possibly chance inclusions.

Webb and DeJarnette[75] have suggested that the sites discussed above be included within the following cultural classification: Lauderdale Focus, Pickwick Aspect, unknown phase, Archaic Pattern. We suggest that the phase be called "Southeastern" as an expression of its geographical limitation.

A number of sites within the Wheeler Basin area on the Tennessee River[76] have given us a few fiber-tempered sherds. Mg°2, a village site on the east bank of the Flint Creek, one mile southeast of Flint Station, Morgan County, Alabama, yielded only three sherds of this type, two of which were decorated with a dentate stamp and had straight rims with rounded and narrowed lips.

A shell midden, Lu°86, located in the southeastern section of Lauderdale County, Alabama, yielded eight rim sherds. Four of these have no decoration; the rims are incurving and the lips rounded and sometimes narrowed. Of the remaining four sherds, one has a straight rim and rounded lip, and is haphazardly decorated with small, ovoid punctations. On the second, the decoration consists of small oval and rectangular impressions; the rim is straight and the lip, narrowed and rounded. The third sherd bears a number of vertical incisions, some of which are closely and irregularly spaced along a vertical row of sporadic punctates. The rim on this specimen is slightly incurving and the lip is narrow and rounded with thin, shallow, and closely-spaced transverse gashes. The fourth and last sherd has narrow, medium-deep, irregular, and roughly incised lines; a straight rim; and a narrowed and rounded lip.

Thirty-three decorated body sherds were also recovered. Three were incised with narrow, medium-deep lines which were roughly parallel and irregularly spaced; four had circular, closely-spaced punctates; three were decorated with a dentate stamp applied in roughly parallel rows; eighteen had punctate impressions which roughly resembled a stamp; four had decoration similar to the fabric impressions found on the later limestone-tempered sherds; and one was smoothed before being decorated with very small, circular punctations, which were placed in irregularly spaced, parallel rows.

Fowke,[77] during his excavations of the Alexander mound in Lawrence Couty, Alabama, recovered a number of fiber-tempered sherds. These closely resemble the sherds described from the Wheeler Basin by Webb.

Brannon,[78] while working in Walker County, Alabama, found a number of sherds which can tentatively be identified as fiber tempered. Associated with them were a number of sand-tempered sherds.

In summing up the information on fiber-

[75] Webb and De Jarnette, 1942.
[76] Webb, 1939.
[77] Fowke, 1928.
[78] Brannon, 1924.

FLORIDA			LOUISIANA S. MISSISSIPPI	ALABAMA	TENNESSEE	
CENTRAL GULF COAST	MANATEE REGION	NORTHWEST GULF COAST	LOWER MISSISSIPPI VALLEY	NORTHERN REGION	EASTERN REGION	
PRE-SANTA ROSA SWIFT CREEK	PERICO ISLAND	DEPTFORD	POVERTY POINT TCHEFUNCTE	ALEXANDER	CANDY CREEK WATTS BAR	A. D. 800 700
	FIBER-TEMPERED?	PRE-DEPTFORD	FIBER-TEMPERED?	FIBER-TEMPERED	FIBER-TEMPERED?	600 500
			COPELL	LAUDERDALE	NON-CERAMIC	400

horizons of the Southeast.

tempered wares from the Pickwick and the Wheeler Basins, J. B. Griffin[79] states:

> While it is recognized that it is a bit premature at this time to attach too much cultural significance to the distribution of this fiber-tempered pottery, it is believed that this method of tempering pottery has cultural importance. The Wheeler and Pickwick Basins, where these sherds have recently been found, represent the northern limits of their range. The ware does not seem to occur west into Mississippi, north into Tennessee[80] or northeast into North Carolina. The ware is much more ornate and varied in its decoration in Georgia, South Carolina, and Florida. The writer feels that its presence in the Wheeler Basin can be attributed to influence from the South Atlantic and Florida Gulf Coast.

[79] J. B. Griffin, 1939.

[80] This statement is not altogether true as Lewis and Kneberg in their latest report on "The Archaic Horizon in Western Tennessee" (1947) state: "The presence of two fiber-tempered sherds, probably Wheeler Plain, is important, since this is the earliest type in the nearby Pickwick Basin in Alabama. These were found in test pits at levels indicating that they were contemporaneous with the end of the shell mound period. Little or no pottery could be associated definitely with the shell mound, except that some seemed to come from the very top of the mound just beneath the alluvium. Most of the pottery was in the plow zone or *at the top of the last alluvial deposit*." (The italics are mine.) In other words, the sherds were found in a secondary deposit.

At the West Cuba Landing site two Wheeler Plain and one Pickwick Simple Stamped fiber-tempered sherds were found. The cultural pattern represented here is apparently a much later one than that which appears farther south in Alabama, Georgia, and Florida, since it consists primarily of a sand-tempered horizon which is called the "Eva Focus of the Archaic." This "focus" is based on a "mere seventeen sherds." Lewis and Kneberg say: "Assuming that the culture was less affected by contacts, we have tentatively suggested an Eva Focus, with this being the type site." Their sherd samples were identified as being tempered with sand, limestone, and shell, and this is accounted for by stating that either a cultural lag existed or a backward people persisted up to and into Late Mississippian times. If this is the case, then, the whole southeastern chronological picture, which has been so painfully built up over the past few years, goes for naught; stratigraphy based on pottery tempers must be discarded; and a new start will have to be made to determine a more definite chronology. The hodgepodge of tempering material found and assigned to the Eva Focus suggests a very much later period than the one assigned by Lewis and Kneberg. It is true that this region of investigation was on the outer periphery of the fiber-tempered area, but nevertheless it cannot be explained away as Lewis and Kneberg have attempted.

SUMMARY AND CONCLUSIONS

A uniform southeastern archaeological area has been outlined, covering the entire states of South Carolina, Georgia, Florida, Alabama, and Mississippi, and portions of Tennessee, Louisiana, and North Carolina. This area is compact in form and has a unity which is demonstrated by the close similarity of traits for the preceramic and early pottery-bearing sites. Culturally, the artifacts recovered can be classified along chronological lines as well as in terms of typological assemblages. No other cultural period has a closer-knit organization than the period under discussion, in that a homogeneous, closely integrated, primitive culture was established without all the added frills of the subsequent cultural horizons.

The period of uniformity began on the preceramic level (Fig. 87). Even with the introduction of fiber-tempered pottery, the basic overall pattern was not disrupted, but was instead enriched. Up to this point there seems to have been a smooth cultural flow with very little, if any, deviation.

With the introduction of coiling, a variety of tempering materials, simple and complicated stamping, a multiplicity of vessel forms, and the purposeful erection of mounds, the cultural pattern becomes more complex and there is no longer a gradual blending into subsequent cul-

tures. The prevailing idea seems to be that the later cultures are a natural outgrowth of the earlier. This, however, cannot be demonstrated archaeologically, There is a definite break in the cultural continuity, which is shown on the accompanying chart (Fig. 87) as a double line between the estimated dates of A.D. 600–700. This break occurs at the beginning of the Tchefuncte period in Louisiana and lower Mississippi and it precedes Deptford, Santa Rosa-Swift Creek, Perico Island, Glades I, the early phases of Malabar I, and St. John's Ia in Florida; Deptford in Georgia; the Alexander Series in Alabama; and Watts Bar in Tennessee. So long as it is present, no definite cultural continuity can be propounded. The sand-tempered, modeled, punctate, and incised wares ascribed to Thom's Creek and early Weeden Island are logically situated to fill the hiatus (?), but until more field work is done and less stress is placed on typology, the gap will continue to plague southeastern archeologists.

Within the southeastern section of the United States there are three loci of fiber-tempered cultures: along the Savannah River in Georgia, along the St. John's River in Florida, and along the Tennessee River in Alabama. Fiber-tempered pottery has also been reported from Texas, New Mexico, Arizona, Nebraska, and Alaska. In all these places it has a basic resemblance to the fiber-tempered pottery found in the Southeast, in that the pots were constructed by modeling, but the surface treatment varies from area to area.

Concerning the earlier horizons, attributed to the Paleo-Indians, very few data are available. Localized concentrations of fluted points of the eastern variant of the true Folsom have been reported, and these cannot be demonstrated to have a definite correlation with the later archaeological cultures. There now exists, therefore, a hiatus between the early lithic cultures of the Paleo-Indians and the much later lithic, pre-pottery cultures of the Neo-Indians. Perhaps the extensive program of investigation being carried on by the Smithsonian Institution, the National Park Service, and the U. S. Engineers will partially fill this gap.

From the foregoing it would appear that the more recent lithic, pre-pottery groups were intrusive into the Southeast, probably following upon the footsteps of an earlier invasion. The peoples of the New World were never static but moved from place to place. It is possible that the development of the rather complex post-fiber-tempered cultures was also due to movements of people.

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AJS *American Journal of Science*. New Haven.
ANSP-J *Academy of Natural Sciences, Journal*. Philadelphia.
APS-T *American Philosophical Society, Transactions*, n.s. Philadelphia.
BAE-AR *Bureau of American Ethnology, Annual Report*. Washington.
BAE-B *Bureau of American Ethnology, Bulletin*. Washington.
GSA-B *Geological Society of America, Bulletin*. New York.
SMC *Smithsonian Miscellaneous Collections*. Washington.
WAS-J *Washington Academy of Sciences, Journal*. Washington.

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PRE-COLUMBIAN TOWERS IN THE SOUTHWEST

ALBERT SCHULMAN

TOWERS have long been an important and integral feature of architecture. The earliest record of towers is in Mesopotamia with the Statue of Gudea at a date of approximately 2700 B.C. (Encyclopaedia Britannica, 1948, p. 330). From there they may be found ranging over the entire world. They have met numerous demands, but from their very beginning towers have served two principal functions: military and religious.

A focal area of tower building was in the southwestern United States. Here towers have presented numerous problems which, despite comment and work, still remain largely unanswered. Their intriguing possibilities, however, early attracted the attention of writers. A brief history would include such men as Jackson (1876), Holmes (1879), and Morgan (1881), who first called public attention to these towers. Their accounts were descriptive and mention ruins of the Hovenweep, Mesa Verde, and McElmo areas. Moorehead, in a series of six articles entitled "In Search of a Lost Race" for *Illustrated American* of 1892, discussed ruins of the McElmo. Prudden (1903), besides mentioning more ruins, attempted to correlate some of the data then known. The first scientific excavations in the area were by Morley (1908), Prudden (1914), and Morley and Kidder(1917). Out of their work came the system of classifying ruins by sites rather than structural features. It remained for Fewkes (1919), however, to assemble and sift the data on this subject and, aided by field work, publish a comprehensive

report. Since his publication there have been various other workers and their reports will be discussed under the respective areas.

There has been little attempt to fully correlate and discuss this problem of towers in the Southwest. This could stem quite conceivably from the fact that the tower areas still remain lightly-worked and little-known. However, if they are dichotomized and individually discussed, it is believed that certain comparisons and conclusions may be advanced.

Quite obviously, any discussion of towers necessitates definition. A definition is of particular importance to this subject inasmuch as various ruins in the Southwest have repeatedly had the appelations "tower," "castle," and "palace" romantically, and grossly, applied. Without doubt many of these structures were built for strength and with an eye for defense, but to label them indiscriminately as "castle" or "tower" is both fallacious and inaccurate. A dichotomy must be made between towers and fortified pueblos.

For the purposes of this discussion the term "tower" will involve the following definition made on the basis of function of structure: A single isolated structure, higher than wide, used primarily for defense.

This definition eliminates the vast group of assorted cliff houses, pueblos, and unit houses that were fortified or made defensive. Quite often towers may have been included in the construction of these buildings, but then they become an integral part of the entire structure and thus lose their identity as true towers. This dichotomy must be recognized.

The distribution of towers in the Southwest is restricted to southwestern Colorado, southeastern Utah, and northwestern New Mexico. To facilitate clarity the entire area has been divided into five territories (Fig. 88):

Mesa Verde. This represents the sites and area of the Mesa Verde National Reservation.

McElmo. This term designates McElmo Canyon and its adjoining area.

Hovenweep. This represents the sites and area of the Hovenweep National Reservation.

Gallina. This area, as defined by Hibben (personal conversation, February 4, 1949), includes the Gallina of Hibben (1938) and the Largo of Mera (1938).

Navajo Country. This is an ill-defined area which includes the territory of the Navajo Country not encompassed by the other divisions.

Quite often there are sporadic reports of towers still extant in various parts of the Southwest. These reports, howver, are usually of an elusive nature and, if the towers are found, they prove to be of post-Columbian origin. The above groups appear to represent the only areas of pre-Columbian towers in the Southwest.

AREAL DESCRIPTIONS

MESA VERDE

Area. Mesa Verde National Park includes 50,275 acres of canyons and mesa lands set aside by Congress in 1906. Mesa Verde itself is 15 miles long and 8 miles wide. On the north it rises 2,000 feet above Montezuma Valley and on the south it terminates in a series of bluffs more than 1,000 feet high. Along the walls of the southern canyons are the majority of the cliff dwellings. The Mancos River runs along the eastern side of the reservation and the western side is bounded by the Southern Ute Reservation.

Ecology. This territory is highland country gouged by numerous parallel canyons running north and south. Rainfall in the area is scanty (18 inches per year). The canyons, however, are annually flushed by heavy spring rains.

History. In 1776, while seeking a short route from New Mexico to California, Escalante made the first recorded observation of this region and named it Mesa Verde (Colorado, 1948, p. 451). In 1888 it was "rediscovered" by two cattlemen, Richard Wetherill and Charlie Mason. Word of this inspired Baron Nordenskiold's exploration of 1891. Subsequent investigation and excavation were carried out by Fewkes during the early 1900's. More recent workers have been Nusbaum (1926; no detailed report made of this excavation), Lancaster and Watson (1942), O'Bryan (1948; field report not yet completed), and Smiley (1949).

Sites. There are approximately 350 cliff dwellings, 400 mesa top pueblos, and several hundred pit houses on the reservation (Colorado, 1948, p. 451). The majority of the pit houses are found scattered along mesa tops; the pueblos are intermittently marked along the mesa and cliff edges; while the cliff houses are in the great natural caves that line the canyon walls. Relatively few of the several hundred known ruins have been worked and no towers have been excavated. One supposed tower, upon excavation, proved to be a kiva with connected subterranean chambers. As this paper is concerned with the problem of towers, the discus-

sion will center on their architectural details.

Towers. The majority of towers are located on easily defended points, which command a good view of the adjoining terrain. A few, however, are so placed that they offer little visibility and defense would appear extremely difficult.

Forms: Circular, oval, D-shaped, or rectangular.

Size: The towers are often two stories high and usually loopholed. There are doorways in the sides. No published report has mentioned the orientation, if any, of these doorways. The largest tower reported was 25 feet high, 11 feet in diameter, contained loopholes, and was constructed of excellent masonry (Wormington, 1947, p. 82).

Construction: Walls were constructed of large brick-like stones shaped by pecking. Stones were approximately of the same size. Usually much mortar was used, although some walls do not exhibit any. The mortar, when utilized, was applied both inside and outside.

Interior features: None are known. The interiors of the various towers incorporated into the pueblos will offer interesting comparisons whenever a tower is excavated.

Dates. None are known for any tower. The cliff houses offer dates ranging from the middle of the eleventh century until the latter part of the thirteenth century. The last building date from Mesa Verde is 1273 (Department of Interior, 1933, p. 49).

Conclusions. Mesa Verde was one of the major foci of the Anasazi. It was related to the general San Juan culture prevalent at that period and, together with Chaco Canyon, exerted influence throughout the surrounding areas. Mesa Verde was gradually deserted during the latter part of the thirteenth century. This was a slow and staggered evacuation but by 1400 the people were all gone. The definite reason for their leaving is a moot problem but the great drought from 1276 to 1299 coupled with the rising warfare (the end of the period reveals increased signs of warfare and violence [Wormington, 1947, p. 82]) strongly influenced and probably caused the withdrawal.

It does not appear that towers played as important a role in Mesa Verde as they did in the other tower areas. In Mesa Verde they seemed to have been a secondary, rather than primary, form of defense. The architecture of the cliff houses implies that the main defenses were based and centered there. The towers that are found appear more akin to observation

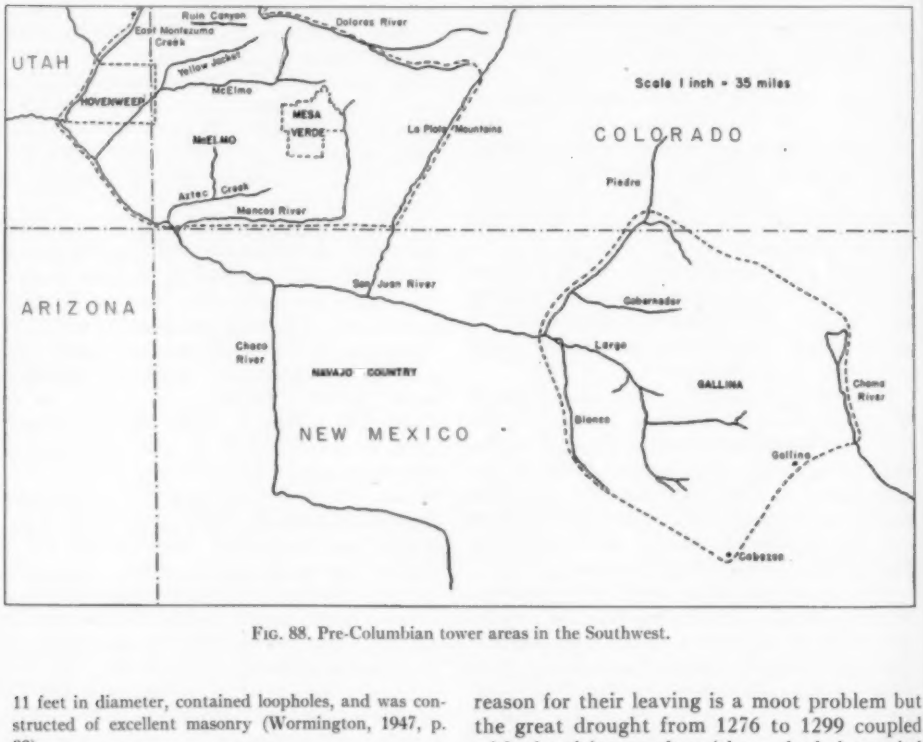

FIG. 88. Pre-Columbian tower areas in the Southwest.

posts and watch towers than to fortresses. They might also have been utilized as kivas, with little or no thought of defense. It is probable that the cliff house architecture and the unity of the people minimized any constant fear of attack and need for tower defenses.

MC ELMO

Area. The area encompassed by this McElmo division takes in that part of southwestern Colorado and eastern Utah not included in the Mesa Verde and Hovenweep groups. It is bounded on the north by the Dolores River, extending to Hill Canyon below Ouray, Utah; on the east by the La Plata Mountains; on the south by the New Mexico-Colorado state line; and on the west by the East Montezuma River. Included within this area are the Mancos River, McElmo Canyon, Yellow Jacket Canyon, Lost Canyon, and numerous tributaries. In the extensive archaeological surveying over this broad territory, the term "McElmo" has been used to designate the entire area.

Ecology. This is high and rolling country cut deeply by numerous canyons. The area is essentially arid, although heavy winter snow leaves seep springs in the sandstone strata.

History. The country had previously been explored by Jackson (1876), Holmes (1879), and Prudden (1903). Excavations were by Morley (1908), Prudden (1914), and Morley and Kidder (1917). Later workers were Fewkes (1917, 1919), Martin (1936, 1938), Morris (1939), and Reed (1945). (McElmo Canyon derived its name from one of the early ranchers in the canyon.)

Sites. The ruins in this area may be classified as pueblos, unit houses, cliff houses, towers, and walls. The pueblos are found on the canyon floors, while the unit houses and some of the pueblos are on the mesa rims. There are few large cliff houses. Because of the topography, the cliff houses are very small, as if they were granaries or lookout stations, or had religious significance. The towers are usually related to the pueblos. Straight or curved walls are frequently found attached to them, leading to the edge of a cliff. (Morley and Kidder [1917, p. 43] use the term "boulder house" for unit houses found on top of isolated masses of rock.)

Towers. Towers are usually found near the mouths of canyons or near pueblos. They often occur on top of detached masses of rock 25 to 30 feet high.

Forms: Circular, square, rectangular, or semicircular.

Size: Towers are usually one-storied, although some two-storied towers have been reported. Height varies from 6 feet to 12 feet with diameter at base ranging from 15 feet to 21 feet (Morley and Kidder, 1917, p. 48.)

Construction: Masonry varies from finely-worked to crudely-pecked, not only in different structures but even in different portions of the same building (Fewkes, 1919, p. 40). The stones are fashioned into blocks and are either coursed horizontally or else the horizontal effect is ignored. If coursed, the stones are neatly faced. Mortar is used in the majority of the structures although where fine coursing and joining is found, mortar is at a minimum (Fewkes, 1919, p. 41). Walls are often double and average 2 to 4 feet in thickness. One particular tower, however, measured 8 feet in thickness (this tower had an interior diameter of 5 feet). Lintels are made of stone or wood. Many of the towers are pierced by a ring of lookout holes, usually 6 inches by 4 inches (Morley and Kidder, 1917, p. 50).

Interior features: The towers may be single rooms or may be partitioned off into two or three rooms.

Dates. Pottery from these ruins is predominantly Mesa Verde Black on White. Reed (1944, p. 56), in his sequence of cultures in the Mancos country, lists towers as prevalent during the period 1150–1300 A.D.

Conclusions. The area encompassed by the general term McElmo has basically the same type of towers throughout. All are comparable in their essential features save for the masonry, which is of inferior quality in Hill Canyon. Generally, the culture also appears to have been the same throughout the area.

Briefly, during Pueblo III, the people of the area, or else newcomers who had been pressed into this area, utilized the defensive form of architecture characterized by fortified pueblos and unit houses and towers.

Because of the large amount of Mesa Verde artifacts found on the sites it is believed that the people from Mesa Verde exerted strong influence over this country, contributing either to the population, to the culture, or to both. The reason for the abandonment of the area is uncertain but, as in the rest of the San Juan area, there was a gradual but definite desertion of the territory during the thirteenth century. This area is largely unworked and any conclusions admittedly are speculative. It would appear, however, that this area was a cultural frontier of the Mesa Verde and that Mesa Verde culture pervaded throughout.

HOVENWEEP

Area. The Hovenweep National Monument was created in 1923 and includes some 299

acres within the states of Utah and Colorado. The ruins are largely within the San Juan drainage basin of eastern Utah and western Colorado. The boundary for the ruins is not well defined but from the Hovenweep border it extends beyond the San Juan River on the south, toward Mesa Verde on the east, and for a number of miles north and south (Riley, 1948, p. 2).

Ecology. This territory is rolling mesa country gouged by numerous shallow canyons that drain into the San Juan River. The land rises from west to east with the western area in the 3,500–4,500-foot zone and the eastern area in the 4,500–5,500-foot zone. Rainfall in the area is scanty with nearby towns reporting 7 inches per year at a 4,800-foot level and 16.72 inches per year at a 7,400-foot level.

History. "Hovenweep" is a Ute word meaning "deserted valley." To the Spanish this country was of little value and seldom traversed. Escalante and Dominguez, the first explorers of Colorado, made a brief reference in 1776 to a ruin in southwest Colorado near the border. A century later, Jackson (1874) and Holmes (1876), on the Hayden expeditions, discovered ruins in the McElmo and Yellow Jacket canyons. Fewkes (1919, p. 44), recognizing the extent and character of the ruins, applied the term Hovenweep to the present general area. Carrol Riley, graduate student at the University of California, Los Angeles, conducted an archaeological survey of the Hovenweep National Monument during the summer of 1948 and very kindly offered his unpublished report.

Sites. There are five ruin groups in the Hovenweep Monument. From east to west these are the Cajon group, the Square Tower group, the Holly group, the Upper Hackberry group, and the Lower Hackberry group. These five form a line extending some 15 miles, with Square Tower being the centermost ruin group. Surrounding these larger sites are numerous small canyons and mesas which contain ruins varying from storage bins to multi-room pueblos (Riley, 1948, p. 7). The relation of the ruins on the mesas to those in the canyons is still uncertain. The canyon ruins are found on the heads or sides of canyons near springs. Ruins in this area include pueblos, unit houses, cliff houses, towers, and walls. The cliff houses are small, generally without kivas, and, like those of the McElmo, resemble storage cists rather than domiciles. The pueblos have come in for very little discussion, overshadowed no doubt by the more romantic towers, but Burroughs mentions that in a superficial examination of sherds from four mesa pueblos, the predominant type was Mesa Verde Black on White. Crude stone walls are common in the Hovenweep.

Towers. These may be found on boulders, mesa edges, or canyon tops, and usually near other ruins.

Forms: Circular, rectangular, or rectangular with rounded corners (Fewkes, 1919, Pl. 23, *a*).

Size: Present height varies from 8 to 10 feet; thickness is 2 feet; and width varies from between 15 to 26 feet.

Construction: The towers are generally of better construction than the other buildings. Building material consists of sandstone blocks of irregular size and shape, fastened in place with mud and mortar. On the outside wall, these blocks are often smoothed. Walls are usually of two layers and average 2 feet in thickness. The towers are usually two-storied and may be surmounted by a parapet (Riley, 1948, p. 8). They may be fitted with a number of slit windows.

Interior features: There are some multi-chamber rooms with walls the thickness of one stone.

Dates. Fewkes (1919, p. 46) considered these ruins contemporaneous with those of the cliff dwellers of Mesa Verde, while Riley (1948, p. 7) identifies the masonry of the Hovenweep as a construction common during Pueblo III times. Making a survey of the painted sherds, he found all to be Mesa Verde Black on White with the exception of a few sherds of McElmo Black on White.

Conclusions. The defense motif is strong in the Hovenweep architecture. The buildings of the Hovenweep are designed and situated virtually always with a view towards strategic position and defense. Walls and towers are often included with each of the larger structures. Hovenweep towers are among the best preserved ruins of the Southwest.

Generally the pattern of the Hovenweep culture appears to be uniform throughout the area. Construction seems to have centered around the Pueblo III period. Burroughs inclines toward the theory of brief and intense occupation of the Hovenweep during that period.

Thus the culture again seems to be the result of Mesa Verde influence on a cultural frontier. The abandonment of the Hovenweep, as in the case of Mesa Verde, was probably due to drought and aggressive warfare.

GALLINA

Area. The country of the Gallina encompasses portions of Sandoval, McKinley, San Juan, and Rio Arriba counties of New Mexico. The Gallina may be tentatively mapped as bounded on the south by Cabezon; on the west by the mouths of the Largo, Blanco, and Gobernador Canyons; on the east by the Chama River; and on the north by going slightly over the New Mexico-Colorado state line. (Roberts [1930, p. 150], in his survey of the Piedra district of southwestern Colorado, lists a three-notched stone ax strikingly similar to the trait ax of the Gallina culture, while Jeancon [1922, p. 13] mentions finding a lookout tower 3 miles to the north along the Piedra.)

Ecology. This territory is characterized by steep pine-covered mesas and broad sage-covered valleys. Altitude varies between 6,500 to 7,500 feet. The terrain is rugged, scarred by, numerous canyons, and uplifted by high mesas and sharp precipices. The climate is marked by short summers and long winters. The growing season is approximately 100 days, and even the summer temperatures are comparatively low. Mean annual rainfall averages 18 inches with the mountain slopes and high mesas receiving the majority of this. (Hibben [1938, p. 3] points out that the majority of the Gallina sites and their terraced gardens are found on the higher slopes.)

History. First Spanish contact with this area was during the 1700's and in the form of reconnaisance expeditions against the Navajos. The first real notice of the Gallina territory after the Spanish period was by E. D. Cope during the explorations of the Wheeler Survey in 1874. In his final report Bandelier made a cursory reference to the ruins. Douglas (1917) surveyed much of the country and mentioned the single houses and "stair-step" gardens. The Laboratory of Anthropology at Santa Fe began reconnaisance and excavation in this area in the 1930's. In the early 1930's Hibben began his work in the Gallina, which is still continuing. The Gallina culture derives its name from Gallina, New Mexico, the scene of some of the earliest work done on the culture.

Sites. Ruins surveyed in the Gallina are of four distinct types: pit houses, unit houses, cliff houses, and towers. *Torreones*, towers with a unit house or pit house attached to them at a later time, are also common. All of these types are scattered throughout the area. The ruins may be found isolated or attached. They are along cliff edges and ridge tops in defensive positions or on low river terraces and mesa tops near land and water. The cliff houses are up canyons beneath overhanging ledges or in caves. All of the five types of Gallina ruins have been excavated (Hibben, personal conversation, June 1, 1949).

Towers. Towers are usually along cliff and ridge precipices, within view of or near surrounding pit houses and unit houses.

Form: Rectangular or circular.
Size: Horizontal dimensions vary from 15 to 26 feet and height is approximately 25 to 30 feet.
Construction: The walls are of double thickness and made of large crudely shaped stone blocks and slabs. Rubble is filled in between the double walls. A simple mud mortar was usually profusely applied.
Interior features: The ventilating shaft, fireplace, and fire screen are all oriented to the south. Bins on the south side protrude from the east and west walls. The floor is flagged and there are occasional wall murals.

Dates. Sure dates from the few excavated ruins are: 1085–1092, 1106, 1239–1267, and 1240–1241 (Hibben, 1948, p. 33–6).

Conclusions. As yet there has been no complete survey of the Gallina territory. (The field trip by the University of New Mexico in 1948 revealed over 95 new ruins [unpublished field report, author participating].) A mere handful of the ruins known have been excavated.

However, certain comments on the Gallina can be summarized. This is a rugged, poorly-watered, "refuge" country. The Gallina buildings are located and constructed virtually always with the idea of defense foremost. Towers play an important role in the location of the other structures. In the absence of towers, the canyons often contain cliff house defenses (Schulman, 1949, p. 234). Structures are invariably discovered burnt and ruined, artifacts are found to be wantonly destroyed, and bodies are uncovered within or around the ruins. Present dating places the culture primarily within the Pueblo III period.

Origin and fate of the Gallina culture are still unknown. Mera (1935, p. 8) believes that it was derived from a Chacoan stem. Hibben (1949, pp. 199–200) also finds Chaco and Mesa Verde features in the Gallina painted wares. In the non-decorated wares, however, he lists possible connections with the Navajo or Woodland. Bahti (1949, p. 58) offers evidence to substantiate the theory that the Rosa phase of

the Gobernador is ancestral to the Gallina. Thus, opinion is still divided as to whether the Gallina culture is a peripheral Pueblo culture with foreign increments, or an intrusive culture with diffused Puebloid traits.

Gradual dispersion to other areas is assumed to have led to the end of the Gallina culture. The causes for this are not definitely known, but undoubtedly the bitter warfare evidenced by the ruins played a strong role.

NAVAJO COUNTRY

Area. The Navajo Reservation includes some 25,000 square miles of Arizona, New Mexico, and Utah. However, the territory actually roamed over by the Navajos was wider and more nebulous. To simplify the problem, and thus perhaps clarify it, this rather loosely defined area has been termed the Navajo Country.

Ecology. Much of this country forms a portion of the Colorado Plateau province with an altitude averaging 5,500 feet. This is a region of flat-lying and slightly tilted rocky plains cut by canyons and topped by mesas and buttes. The country drains north into the San Juan and south into the Puerco, Little Colorado, and Colorado rivers. This is semi-arid country with actual desert in many places (Hill, 1938, p. 13).

History. The Navajos, briefly, are an Athapascan-speaking people with a culture of mixed Pueblo and Plains traits (Amsden, 1932, pp. 197–8). They first appeared in the Southwest within the San Juan region. Their time of arrival is uncertain but dating ranges from the latter part of the fourteenth century to the fifteenth and sixteenth centuries (Amsden, 1932, pp. 196–7). Earliest European contacts with the Navajos were in the Chama Valley during the late seventeenth century. Acquiring horses somewhere between 1630 and 1700, the Navajos spread southward though the Jemez River gateway to make raids and depredations on the Pueblo Indians and the Spanish (Keur, 1941, p. 5). From then on, they are intimately related to the historical period of the Southwest.

Archaeologically the Navajo Country has been rather scantily worked. Kidder (1920) was the first to point out ruins in the upper San Juan Valley of New Mexico. He found round towers of an historic date. Father Berard Haile (1937, mimeographed report), Hibben (1937), and Murphy, in 1937, all found evidences of hogan sites in this area. Van Valkenburgh of the Park Service has worked extensively in the old Navajo Country and found numerous evidences of historic Navajo ruins. Stanley Stubbs, of the Laboratory of Anthropology in Santa Fe, surveyed widely in the Gobernador and Largo Canyons in 1929. Stubbs found towers but he places them all within the "refuge period" of 1673–1750 (personal conversation, November 27, 1948). Malcolm Farmer (1938), in his San Juan Basin survey, excavated two hogans and trenched a trash pile. His was the first archaeological excavation in this area and he obtained the dates 1745 and 1762. Keur (1941, p. 69), in her work at Big Bead Mesa in Guadalupe Canyon, excavated numerous hogans and assorted adjoining structures and received dates ranging from 1745 ± 20 to 1812 ± 20. Hall (1944, p. 100), working with three specimens from a hogan in the Gobernador, obtained the dates $1491 + X$ to 1541 ± 20.

Conclusions. With only the above data, any attempt to discuss pre-Columbian towers in the Navajo Country is admittedly audacious. However, there are three facets to this problem which merit discussion inasmuch as they are directly applicable to the over-all problem.

First, on the basis of several localized surveys, no evidence has been found of pre-Columbian towers in the Navajo Country. All of the towers that have been reported upon are of post-Columbian origin. Secondly, save for the one hogan site of Hall's, there is no positive, corroborated evidence of any pre-Columbian Navajo occupation in this entire area. Thus, at best, the earliest sure evidence of Navajos being in this area points only to the latter part of the fifteenth century. Finally, the Navajo Country lies between the McElmo-Hovenweep-Mesa Verde area and the Gallina area; is of a similar environment; possesses comparatively easy routes of movement; and yet supposedly does not possess any evidence of contact between either of these tower areas.

Admittedly only a relatively localized portion of the country has been surveyed, yet the negative evidence gleaned from this survey is as important as any positive evidence and this negative evidence can be a strong determinant of the final conclusions concerning the tower problem.

CONCLUSIONS

Although we have defined the word "tower" in such a way as to distinguish it from the structures incorporated into pueblos, e.g., at Chaco Canyon, it should be understood that this does not imply a lack of relationship between the two

types. For the sake of clarity, our discussion of towers has been limited to "isolated structures." However, both isolated structures and the "towers" incorporated into pueblos are aspects of the same problem, and due cognizance of this must be taken in future reports.

The type of tower found at Chaco Canyon has been amply discussed in previous, general reports, and its position within the general pattern of architecture is rather well established. However, little note had been taken of the type of tower discussed in this report. By presenting the distribution of this type of tower and summarizing the available data, we hope to make it possible for future reports to consider the tower problem in its full complexity.

With this in mind, we may proceed to the conclusions concerning the isolated towers. Inasmuch as the conclusions about each tower area have already been discussed, we shall only attempt some semblance of order or relationship between the various areas.

The most important relationship is that among the Mesa Verde, Hovenweep, and McElmo areas. These three are directly linked with each other.

The culture of these areas reached its height during the Pueblo III period. There was a dense, prosperous population which utilized all of the available agricultural land. This disappeared toward the latter part of the thirteenth century as the result of a mass exodus to the south, southwest, and southeast. The evacuation has usually been attributed to increased nomadic raids aided by the Great Drought. However, Linton (1944, pp. 28–32) brilliantly illustrates that nomadic raids in this area during that particular time are of a highly elusive nature and lacking in proof and validity. He suggests rather that the Anasazi communities fought among themselves and that the defense motif was strictly for protection from each other.

Linton lists the rapid growth of population, soil exhaustion, and recurrent droughts as being the direct causes of the aggressive, bitter competition for agricultural land. Neighborhood wars with mass attacks and constant threat would inevitably lead to close-lying, heavily-fortified settlements as in Mesa Verde and Chaco Canyon. Even these, however, were of no avail when soil exhaustion and severe droughts reached their climax at the end of the thirteenth century and forced the final withdrawal.

Carrying Linton's thesis one step further, the McElmo and Hovenweep variations of Mesa Verde become intelligible. These two areas are peripheral to Mesa Verde. The land is poorer, the terrain more rugged, and the environment more formidable. Here was pushed, or already existed, a culture similar to that of Mesa Verde. Because of the poorness of the environment, these people did not have a large population nor could the land support close-packed pueblos. This led to a condition characterized by numerous small and independent pueblos and unit houses, sturdily defended and often marked with towers.

These towers served as watch towers, lookouts, and defense units. In the Hovenweep and McElmo they played an important and integral part in defense. Lacking large populations, huge compact settlements, and unity, the people were forced to build numerous small defenses and towers to meet their small-group needs.

Chaco Canyon had no need for such defenses. At Mesa Verde the huge cliff houses relegated towers to a subordinate defensive, and often religious, role. Only the in outerlying parts of Mesa Verde do towers begin to approach the types that appear in the Hovenweep or McElmo.

In attempting to relate the Navajo Country either to the Mesa Verde-Hovenweep-McElmo or to the Gallina areas negative evidence is significant. Although lying directly between these two towers areas it offers no evidence of relationship between them.

Then too, save for the hogan site of Hall's, there is no positive evidence of pre-Columbian Navajo occupation in the area. Thus, any attempt to attribute the downfall of the tower areas to the Navajos rather lacks factual evidence. There is no positive data to prove even that the Navajos were in the area during the Pueblo III period.

This conclusion must be remembered when discussing the Gallina complex. The Gallina culture offers itself as a puzzling enigma. Briefly, it appears as a Puebloid culture in a peripheral Puebloid area. It contains, however, certain non-Puebloid traits that are too strong to be ignored. Whether the Gallina were a people from the San Juan area who during the Pueblo III agricultural movements traveled east into the Gallina and along the way acquired certain non-Puebloid traits, or whether the Gallina were a non-Puebloid group who moved into the Gallina country and adopted the Puebloid culture, is still an unanswered question.

The problem of what happened to Gallina culture, however, can perhaps be answered. Confronted with structures burnt and ruined, artifacts wantonly smashed, and persons of both sexes and all ages indiscriminately killed, two possibilities are offered in explanation:

1. The Gallina people were attacked by an outside group.
2. They fought among themselves.

Viewed objectively, the data strongly indicate that a group outside of the culture did not destroy it. Rather, they reveal that the Gallina fought among themselves and thus weakened and caused their own eventual migration. Although it is not the purpose of this report to discuss each culture in detail, a few of the proofs to substantiate this theory might be listed inasmuch as they reiterate the tale in the other tower areas.

1. The physical type found is always closely related to the Gallina *classique*.
2. The skeletons are of all ages and both sexes.
3. Artifacts appear to have been wantonly destroyed.
4. There are virtually no foreign artifacts.
5. No new cultural increments lie on top of the Gallina deposits.

This evidence serves strongly to indicate that a group foreign to the culture did not destroy it, but rather that the Gallina destroyed themselves.

The reasons why the Gallina people fought among themselves are not as evident nor can they be as objectively proved. However, as in the case of the other tower areas, one of the prime reasons for internal warfare might well have been increased population with its bitter competition for land. This condition is not new and can be duplicated throughout the world. It was particularly aggravated in the Gallina, however, inasmuch as the country was "refuge" to begin with, and any disputes over land would therefore be carried to bitter ends.

In final summation, pre-Columbian towers are found only in the San Juan region of the Southwest and only during the Pueblo III period. This was the peak of the Anasazi development, and increased population probably forced many of the people into peripheral, less-desirable areas. This in turn resulted in warfare over land and led to the construction of numerous small, strongly defensive habitations. Aggression reached its height near the end of the thirteenth century, when a combination of soil exhaustion, drought, and increased population resulted in migration and dispersion from the area.

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AAn AMERICAN ANTIQUITY.
BAE-AR *Bureau of American Ethnology, Annual Report*. Washington.
BAE-B *Bureau of American Ethnology, Bulletin*. Washington.
SAR *Smithsonian Annual Report*. Washington.
SMC *Smithsonian Miscellaneous Collections*. Washington.

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FIVE SITES OF THE INTERMEDIATE PERIOD

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SHORTLY before the last war I prepared for publication a monograph on the tumuli of Pennsylvania. War conditions prevented its immediate publication, and so it was put aside until 1948 when a few additions and changes were made. By this time it had grown to include the detailed descriptions of 63 mounds plus a fearsome array of plates. No editor would touch it.

This year the study will at last appear, published by chapter in various journals.[1] The brief report which follows was an appendix, included for comparative purposes. It deals with five scattered burial components excavated by three students of archaeology: Dr. Lewis M. Haggerty, a dentist of Hackensack, New Jersey; Mr. Harry L. Schoff, former professional archaeologist, now of Honeoye Falls, New York; and Mr. Gerard Fowke, pioneer Smithsonian archaeologist. I am indebted to the former men for the use of their field notes and to the U. S. National Museum for photographs of the Bowman mound material.

ROSENKRANS SITE

During the summers of 1941, 1947, and 1948 Dr. Haggerty made a notable discovery in Sussex County, northern New Jersey: a total of thirteen graves which contained secondary, flexed, and cremated burials of both adults and children. Attendant grave goods amply link the remains to the Middlesex Focus.

The component occupies a small portion of a sandy bluff overlooking the Delaware River on the so-called Rosenkrans site. For a more specific location the reader is referred to the *Archaeology of New Jersey* by Dorothy Cross;[2] the graves lay just north of her Trench 5 and extended west toward a chicken coop shown on Plan 41. At least one other component, presumably prehistoric Munsee, existed at the station, and though a few graves belonging to this later period were intermingled with the Middlesex burials, they could be readily distinguished. Briefly the facts are as follows.

Burial 1. Attracted by two plow-exposed gorgets (Fig. 89, *e*, *f*), Dr. Haggerty unearthed, a few inches beneath them, the gorget fragment and chipped stone pieces shown in Figure 89. At 9 inches, directly below, appeared a pentagonal pendant and gorget (Fig. 89, *a*, *d*), both stained with limonite and lying about 6 inches apart. At 20 inches from the surface occurred still another gorget, this one of banded slate (Fig. 89, *c*). Scattered through the pit were the charred remains of a male adolescent, a calcined dog tooth, a chip of jasper and another of chert, a fire-cracked celt (Fig. 89, *h*), and a worked pebble—possibly a celt or gorget in the process of manufacture (Fig. 89, *g*). The pendant and gorgets are all of slate, specimens (*b*) and (*e*) being made of a red variety. Chipped stone artifacts include the following types: (*s*) single-shouldered blade and (*n*, *o*, *r*) large stemmed blades, all of Onondaga chert; (*i*) blade of purple argillite, (*j*, *l*) stemmed points, (*k*) pentagonal point, and (*p*, *q*) larged stemmed blades, all of a dark chert probably from the Oriskany formation in New Jersey or Pennsylvania; and, finally, (*m*) a notched blade of yellow-blue chalcedony.

Burial 2. From a charcoal deposit 24 inches deep Dr. Haggerty recovered three enormous copper beads which lay side by side, connected by a thong, and preserving a strip of bark (Fig. 90, *A*, *e*). The area in general appeared disturbed, and it seems likely that it was here that a former excavator, a Mr. Gleason, discovered 100–150 somewhat smaller copper beads. No bone remains were observed directly within the pit, although about 20 inches distant appeared a skull and long-bone fragments of an adult male, believed to belong to a later period.

Burial 3. An adult male (?) skull lay in clean sand beneath the eastern edge of a roughly triangular stone slab measuring about 31 inches on a side. The depth of the slab was 22 inches; to coarse gravel at the bottom of the pit, 37 inches. Sixteen inches southwest of the skull occurred a heap of beads, 9 made of conch columellas and 19 of thick, rolled copper (Fig. 90, *A*, b, *f*). Beneath the skull and beads appeared a layer of charred wood, 6–10 inches thick, with a slightly larger diameter than the slab above.

Burial 4. This pit was 29 inches deep and 2–3 feet in diameter with a stratum of ash, charcoal chunks, and burned sand at a depth

[1] The first will appear in the *Pennsylvania Archaeologist*, Vol. 19, Nos. 3–4, 1950.

[2] Cross, 1941, pp. 132–43.

of 22 to 26 inches. Within the ash bed lay an adult calvaria covered with thin sheet copper which had preserved an intervening twined fabric (Fig. 90. *A*, *i*); a perforator of Ohio (?) jasper (Fig. 90, *A*, *c*); 28 beads of rolled sheet copper lying in an oval formation (Fig. 90, *A*, *g*); the deciduous tooth of a child about 5–6 years old; and strips of bark shrouds (?) or covering preserved by the copper beads. In clear sand 10 inches southwest of and slightly higher than the beads lay a remarkable copper boatstone, oxidation of which held fast a conch columella bead (Fig. 90, *A*, *d*). Eight inches below the beads and again in white sand occurred a blocked-end tube of limestone with one end partially decomposed by either weathering or fire (Fig. 90, *A*, *a*).

Burial 5. This grave occupied a roughly circular pit about 2 feet wide and 26 inches deep. Twenty to 24 inches down appeared an area of ash, charcoal, and burned earth that contained the enamel teeth caps and mandible of a child of 8–10 years; an extended string of 348 copper beads of varying size which had preserved a bark covering (Fig. 90, *A*, *h*); and the complete skeleton of a rodent stained by copper, with 5 conch columella beads similar to those in Figure 90, *A*, *b*, intermingled with the bones. Below the burial occurred first a layer of fired sand, then a stratum of fire-broken stones and charcoal on the pit bottom.

If this pit is regarded as the eastern point on a circle 7 feet in diameter with features at each of the four cardinal points, then at the south lay an adult bicuspid and a heap of jasper chips 28–30 inches deep; at the west, a small flaring-bit celt of copper found 33 inches below the surface; and on the north, at 11 inches, a banded slate gorget with notched end and an ulu-like ridge with parallel incising. These latter specimens, both of which are illustrated in Figure 90, *A*, *j*, *k*, were isolated from, and of unknown relationship to, the burial proper. It appears, however, that the charcoal stratum found at the bottom of the pit extended well to the west, and it was from this stained layer that the tooth and celt were recovered.

Burial 6. This was an adult bundle burial in poor condition plus bits of charred and calcined bone. The bones lay side by side beneath the skull at a depth of about 2 feet. No soil discolorations or pit lines were observed.

Burial 7. This was the deepest pit excavated here, measuring 42 inches. At approximately 2 feet occurred an oval charcoal layer, 2 feet long, 4 feet wide, and 10 inches thick in the center, from which were recovered the following: the cremated remains of a human adult; a calcined antler tine and charred pig nut; the chipped stone pieces shown in Figure 90, *B*, *e*, *f*; quantities of charred, hollow twigs; a charred dowl 0.9 inch in diameter and 14 inches long, showing definite signs of having been worked and suggesting the lower part of a celt handle or the like. Several of the hollow twigs, including a piece 5 inches long and ½ inch in diameter, bore what appeared to be artificial perforations and closely resembled a whistle or even a panpipe.

Twenty-seven inches from the surface lay a boatstone of burned sandstone (Fig. 90, *B*, *b*) associated with a mass (about two-thirds of a cigar box) of fire-shattered stones, including two or three celts. A few inches below and 15 to 18 inches to one side, lay a broken but quite similar boatstone (Fig. 90, *B*, *a*), which again lay in a mass of fire-broken stones, charcoal, and ash, 8 by 12 inches in size. In clean sand 3 feet down occurred the fine-grained sandstone, blocked-end tube and pebble "plug" shown in Figure 90, *B*, *d*. And finally, from the spoil heap came a partially drilled fragment of some slate object, broken perhaps during manufacture and then re-worked into a "winged" object of unknown use (Fig. 90, *B*, *c*).

Burial 8. At a depth of 2 feet and on one edge of an oval charcoal deposit, 24 by 30 inches in diameter and 6–10 inches thick, lay an adult cranium, 9 vertebrae, and the 2 proximal ends of the humeri. All were stained by copper except the skull cap, which had largely disappeared. Two irregular stones lay over the bones, and with the burial had been placed two corner-notched projectile points of Onondaga chert and a semi-lozenge point of Oriskany chert (Fig. 90, *B*, *g*).

Burial 9. Here we come to one of the most remarkable graves known to the writer. In an oval pit 3 feet by 4 feet in diameter and at a depth of 3 feet appeared a bed of charcoal 8–10 inches thick. Associated with this mass of charcoal were great chunks of very light cinders, several of which showed fabric impressions of twined weaving (Fig. 91, *d*) and encased charred twigs.[3] Included in the stratum were calcined

[3] "The specimens examined are essentially carbonized substances, produced by combustion where gases were per-

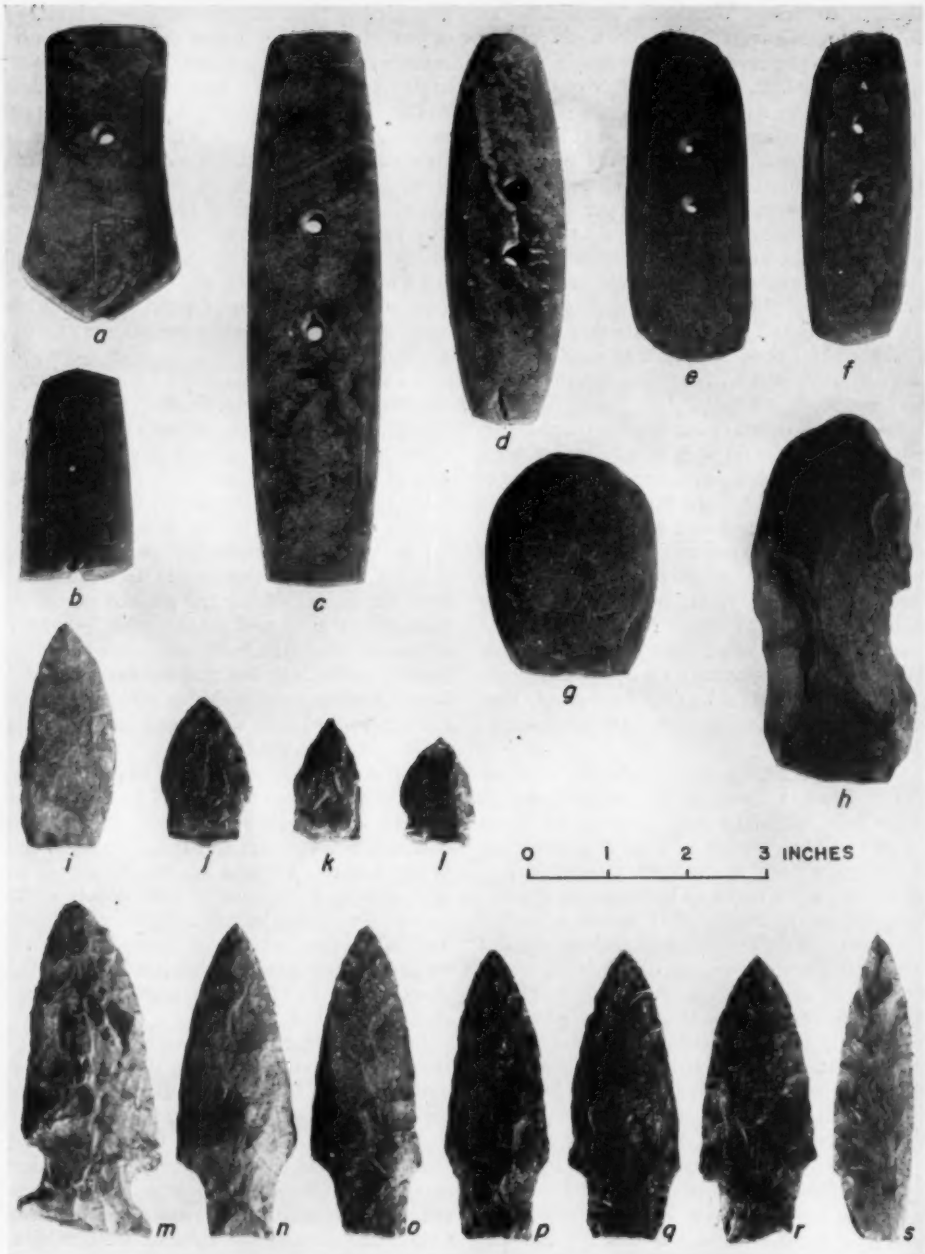

FIG. 89. Artifacts from Burial 1, Rosenkrans site, Sussex County, New Jersey.

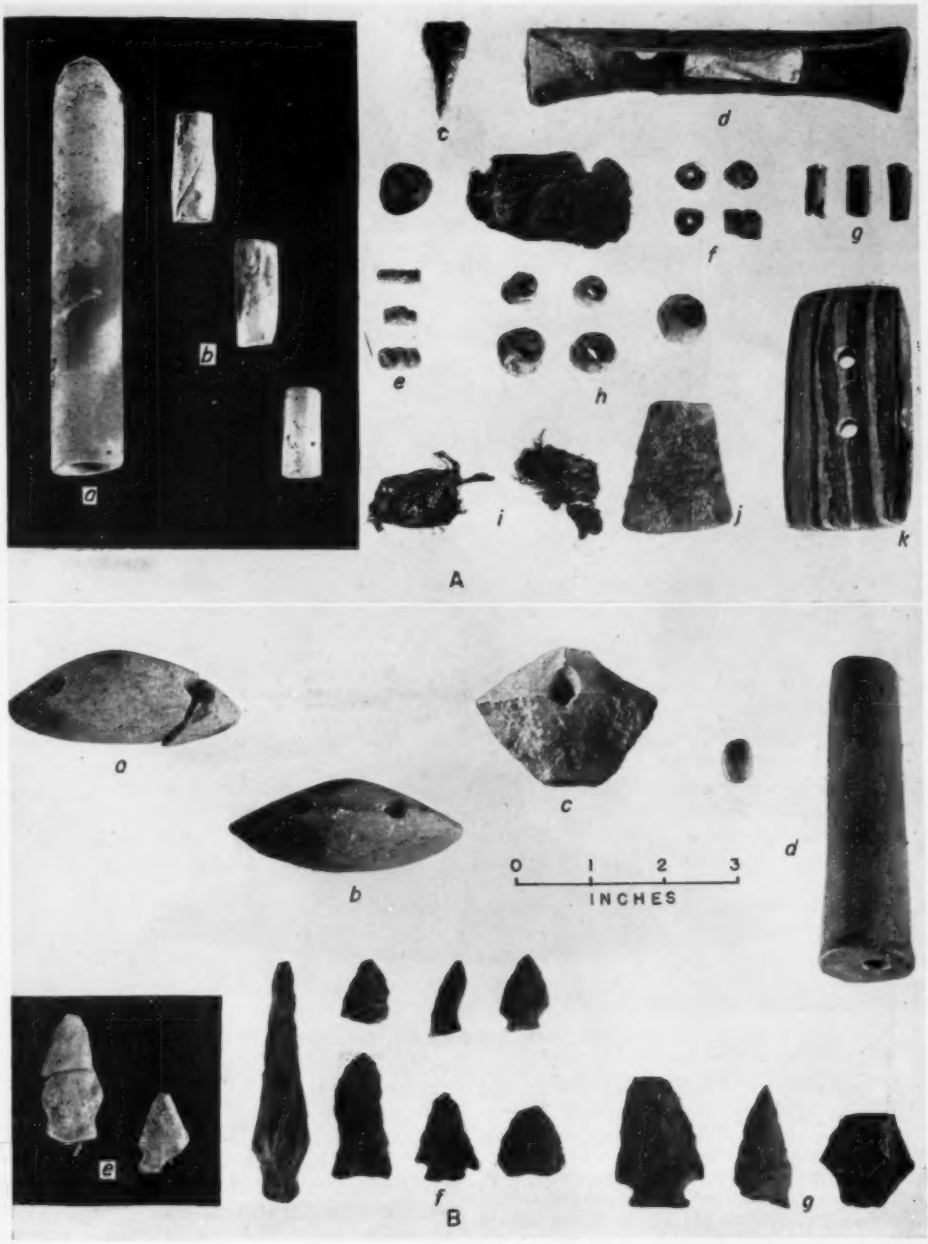

FIG. 90. Artifacts from the Rosenkrans site, Sussex County, New Jersey. A: *a, c, d, g, i*, Burial 4; *b, f*, Burial 3; *e*, Burial 2; *h, j, k*, Burial 5. B: *a–f*, Burial 7; *g*, Burial 8.

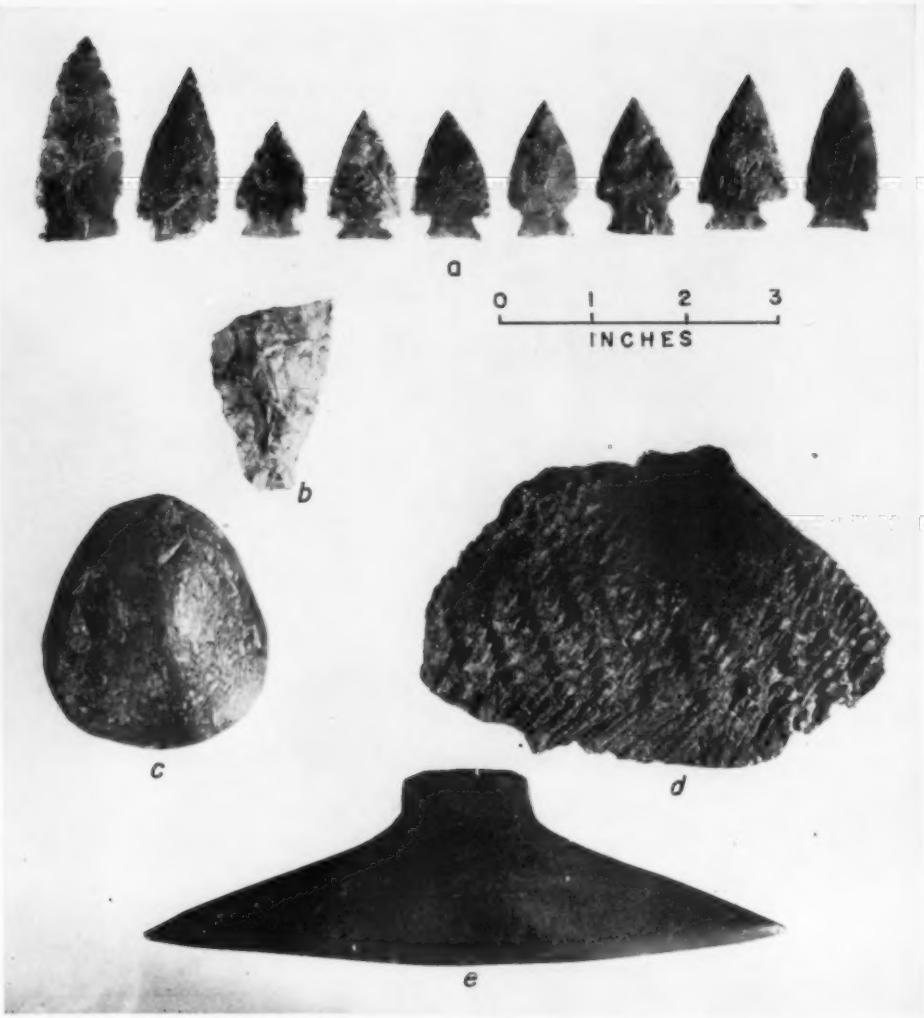

FIG. 91. Artifacts from Burial 9, Rosenkrans site, Sussex County, New Jersey.

bone fragments of a human adult and child with the following burial accompaniments: Near the center lay nine finely chipped corner-notched points (Fig. 91, *a*), the basal section of a crude blade (Fig. 91, *b*), and a broken blade of indistinguishable form, all of Onondaga chert; and 3 jasper chips. To one side appeared the calcined skull of the adult skeleton, along with a magnificent boatstone of red-purple slate (Fig. 91, *e*), three beads of sheet copper, a steatite cone (Fig. 91, *c*), a square copper awl, and a small fabric scrap of twined weave. Underlying the deposit was the pyre, a heap of

mitted to escape but where there was an insufficiency of oxygen, somewhat analogous to the manufacture of bituminous coal. You ask whether the human body, if cremated under these circumstances, might leave such a residue. The answer is, yes." Professor Robert M. Brick, Department of Metallurgy, University of Pennsylvania, September, 1948.

sticks and small logs, which had been reduced to charcoal *in situ*, a fact which is further attested by the fire-reddened walls of the grave pit.

Burial 10. At a depth of 22 inches lay the secondary burial of a young adult male (?), whose rotted bones were stained both green by strips of sheet copper and red by an ample supply of ocher deposited beneath the skeleton. Close by had been placed a mass of broken limestone blocked-end tubes, totaling about a dozen fragments and probably representing four complete specimens. Intermingled with the bones and tubes were two shaped pebble "plugs" (Fig. 92, *g*), an antler arrowhead with oval cross section (Fig. 92, *c*), two chips of jasper and two of chert, a rodent jaw, an estimated 12–15 conch columella beads similar to those in Figure 90, *A*, *b*, and perhaps an equal number of sheet copper beads (Fig. 92, *e*). In this general area there also lay the two perforators depicted on Figure 92, *f*. Dr. Haggerty removed a large portion of this burial with its accompanying offerings *en masse*, and it so remains today, a remarkable mass of tubes, beads, bones, and perhaps additional objects as yet unknown. To one side of this deposit lay a striking boatstone (Fig. 92, *d*), while along the periphery appeared a chert blade (Fig. 92, *h*).

From a separate but apparently adjoining pit came a cache of ten chipped stone pieces and two gorgets, one a crude, partially drilled affair found a foot beneath the surface and the other of banded slate, resting on the bottom of the pit (Fig. 92, *b*, *a*). The projectile points, all of which are illustrated in Figure 92, lay in an oval charcoal deposit 3 by 4 feet in diameter. Of the specimens of distinguishable form, all were stemmed types made of the following materials: (*i*, *l*, *n*, *p*, *q*) Onondaga chert, (*j*, *m*, *o*) argillite, (*r*) Oriskany chert, (*k*) unknown.

Burial 11. At a depth of 2 feet appeared 22 occluded teeth of a young adult, scraps of copper-stained bones, charcoal flakes, and 15 thin, rolled copper beads.

Burial 12. Seventeen inches deep and in a charcoal bed 8 by 10 inches square and 6 inches thick, were discovered the rotted skeletal remains of a child of 8–10 years. Accompanying this burial were 106 tubular beads of sheet copper and a tight mass of approximately 100 Marginella shell beads.

Burial 13. Here were uncovered the decomposed bones and erupted teeth of a child of about 3–4 years, plus a small calcined bone fragment. Both types of copper beads found at this cemetery were represented in the mortuary offerings: 14 tubular beads of thin sheet copper and 25 small, barrel-shaped ones made by bending a thick, rectangular strip of copper until the two ends overlapped and then hammering them together. In addition to a small Vinette I-like sherd of uncertain provenience with grit-temper and both interior and exterior cording, a chip of jasper was recovered from the grave fill.

Other Pits. At two points within the cemetery area appeared pits containing pockets of red ocher. The first, uncovered at a depth of about 2.5 feet, proved to be 10 by 16 inches long and 2 to 4 inches thick. At each extremity and on the same level occurred charcoal deposits about 2 to 4 inches thick and roughly a foot in diameter. The second deposit, found at a depth of 2 feet, was much the same but lacked the charcoal layers. Again associated artifacts and bone were absent.

KIPP ISLAND

Evidence of previous excavations and recent woodchuck activity exposing bits of human bone led to Mr. Schoff's discovery in May, 1934, of nine Point Peninsula graves near an old pear orchard on the southeast end of the west (?) part of Kipp Island, Town of Tyre, in Seneca County, central New York. Subsequent finds from apparently this same cemetery have been described in some detail by Ritchie.[4]

Grave 1. A flexed adult, in poor condition, was uncovered at a depth of 28 inches. By the hips lay a pottery tubular pipe (Fig. 93, *A*, *b*), and over 25 Marginella shells with the ends ground off (Fig. 93, *A*, *n*), perhaps from a beaded pouch, were massed around it. Nine long cylindrical shell beads (Fig. 93, *A*, *o*) arranged around the skull suggested the remnants of a headdress.

Grave 2. A flexed adult lying on its right side and in good condition, 28 inches deep. Near the hips lay a small granite celt and a scraper made from a deer scapula (Fig. 93, *B*, *g*), while in front of the knees appeared an engraved antler comb (Fig. 93, *B*, *o*), an ulna awl (Fig. 93, *B*, *j*), and 9 chert chips with a mass of oxidized iron pyrites (limonite), the latter probably a fire-making kit. Behind this skeleton, yet in

[4] Ritchie, 1944, pp. 132–43.

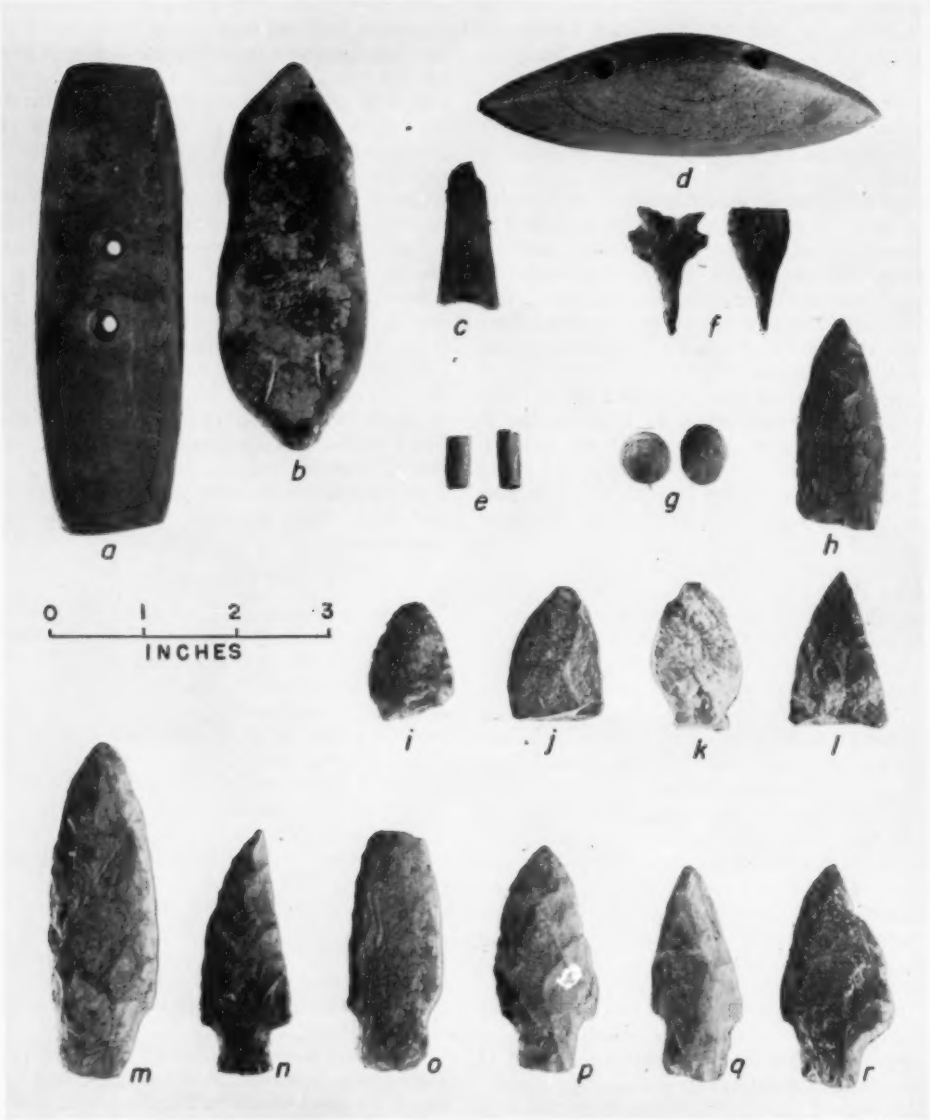

FIG. 92. Artifacts from Burial 10, Rosenkrans site, Sussex County, New Jersey.

the same pit, lay the remains of an adult female (?) in good condition, unaccompanied by mortuary offerings. Both skulls appeared to be very high and narrow and were considered exceptional.

Grave 3. A flexed adult lying on its right side. headed west, 30 inches deep. The following objects had been placed near the hips: An almost tubular, pottery obtuse angle elbow pipe with 2 rows of roulette impressions near the mouth (Fig. 93, *A*, *c*); a natural "lucky" stone; a square native copper awl 3¼ inches long (Fig.

93, *A*, *g*), and a large coarse grey-blue flint blade 8¼ inches in length that lay broken in 3 pieces and piled beside the awl (Fig. 93, *A*, *h*).

Grave 4. A flexed adolescent in very poor condition was uncovered at a depth of 20 inches. An undecorated, almost tubular pottery obtuse angle elbow pipe (Fig. 93, *A*, *d*) and a curved bone needle with a central eye (Fig. 93, *B*, *p*), both lying at the hips, and about 30 badly decayed shell disc beads near the skull constituted the burial goods of this grave.

Grave 5. The lower half of an adult skeleton with the pelvic bones intact, lying at a depth of 24 inches, had apparently been partially explored by former excavators. On the left ilium appeared a blocked-end tube of Ohio fireclay, 6 inches long and one inch in diameter, with rounded, not expanded end (Fig. 93, *A*, *i*). The hole in this tube ran from the full diameter to three-eighths of an inch at the other end with the small opening pointed toward the skull. Parts of 3 strong, multiple-bilaterally-barbed harpoons (Fig. 93, *B*, *c*, *e*), 2 with straight edges and beveled sides, were mixed in the grave fill.

Grave 6 contained the badly decayed, flexed skeleton of an adult, buried 31 inches deep. The following artifacts were obtained here: at the hips, a fine gray Ohio grindstone pendant (Fig. 93, *A*, *l*); at the elbows, a red slate pendant (Fig. 93, *A*, *m*); at the occiput, 5 rolled copper beads and several badly exfoliated shell disc beads; and back of the skull, an antler comb (Fig. 93, *B*, *m*).

Grave 7. At a depth of 30 inches two flexed adult skeletons lay facing each other, 18 inches apart with heads to the west. Between the skulls was a cache with the following objects: a bar amulet of Ohio fireclay, broken at both ends (Fig. 93, *A*, *k*); 2 deer ulna awls (Fig. 93, *B*, *k*, *l*); a remarkable thin green granite knife or scraper with an antler handle (Fig. 93, *B*, *a*); 2 large antler fish-hooks; a large antler flaker (Fig. 93, *B*, *i*); a blade of Flint Ridge chalcedony (Fig. 93, *A*, *f*); a worked beaver incisor, an awl made of bird bone, and a conical bone arrowhead (Fig. 93, *B*, *d*, *h*, *n*); 3 notched arrow points; 4 blanks of yellow jasper; 5 cache blades of chert; 45 chips or flake knives; and a small quantity of red ocher.

Grave 8. A flexed adult lay on its right side, in poor condition, 34 inches deep. At the hips were an antler gouge or chisel, 6½ inches long and squared on the small end (Fig. 93, *B*, *f*), while in front of the elbows were an ulna awl and a fine gray limestone blocked-end tube with rounded end, 4¾ inches long (Fig. 93, *A*, *j*). A one-inch section at the small end of the tube had been broken off and lay at the opposite end of the tube. Back of what remained of the skull was a stubby bone awl made from the joint end of a deer leg (Fig. 93, *B*, *b*) and around the neck were ten tubular shell beads so badly decayed that they could not be removed.

Grave 9. This was a boulder-lined burial pit, 4½ feet deep and 3 feet 4 inches by 4 feet 10 inches in area, located about 20 feet west of the first eight graves. On the bottom of the pit a crudely rectangular ring of glacial stones, predominantly granite and varying is size from 9 inches in diameter to as large as a man might lift, enclosed a few bits of badly decayed bones, enamel caps of teeth, and on the west end near the teeth, a fine sandstone platform pipe (Fig. 93, *A*, *e*) and a broken chert drill. A dark strata, semicircular in cross section, was interpreted as evidence of a perishable covering over the boulders.

BLUFF POINT MOUND

In the west-central section of Eagle Bluff (an island since the construction of the Barge Canal), Sibley estate, Town of Montezuma, Cayuga County, New York, just north of the New York Central Railroad bridge over the Seneca River, there stands a large granite boulder covered with anvil and mortar pits of aboriginal origin. A few hundred feet directly south of this stone lay a small burial mound, about 8 feet long, 5 feet wide, and less than 30 inches high in the center, which showed some evidence of having once been plowed. In the approximate center lay the badly decayed bone fragments and enamel teeth caps, of apparently a flexed skeleton, headed west. It appeared that this burial had been made by scooping a shallow grave out of the extremely hard gravel and then covering the remains with a gravel mound. The duff line of the old living surface clearly outlined this construction. Near the eastern side of the pit were seven chert points (Fig. 93, *A*, *a*); a translucent leaf-shaped blade of chalcedony from the Flint Ridge quarries (Fig. 94, *c*); 2 cache blanks of yellow jasper; a notched arrowpoint of chert; a greenish-gray steatite platform pipe (Fig. 94, *f*), and a heavy native copper celt 7 inches long (Fig. 94, *i*). Two subsequent visits to the site yielded first, two arrowpoints of Labrador chalcedony (?) or more

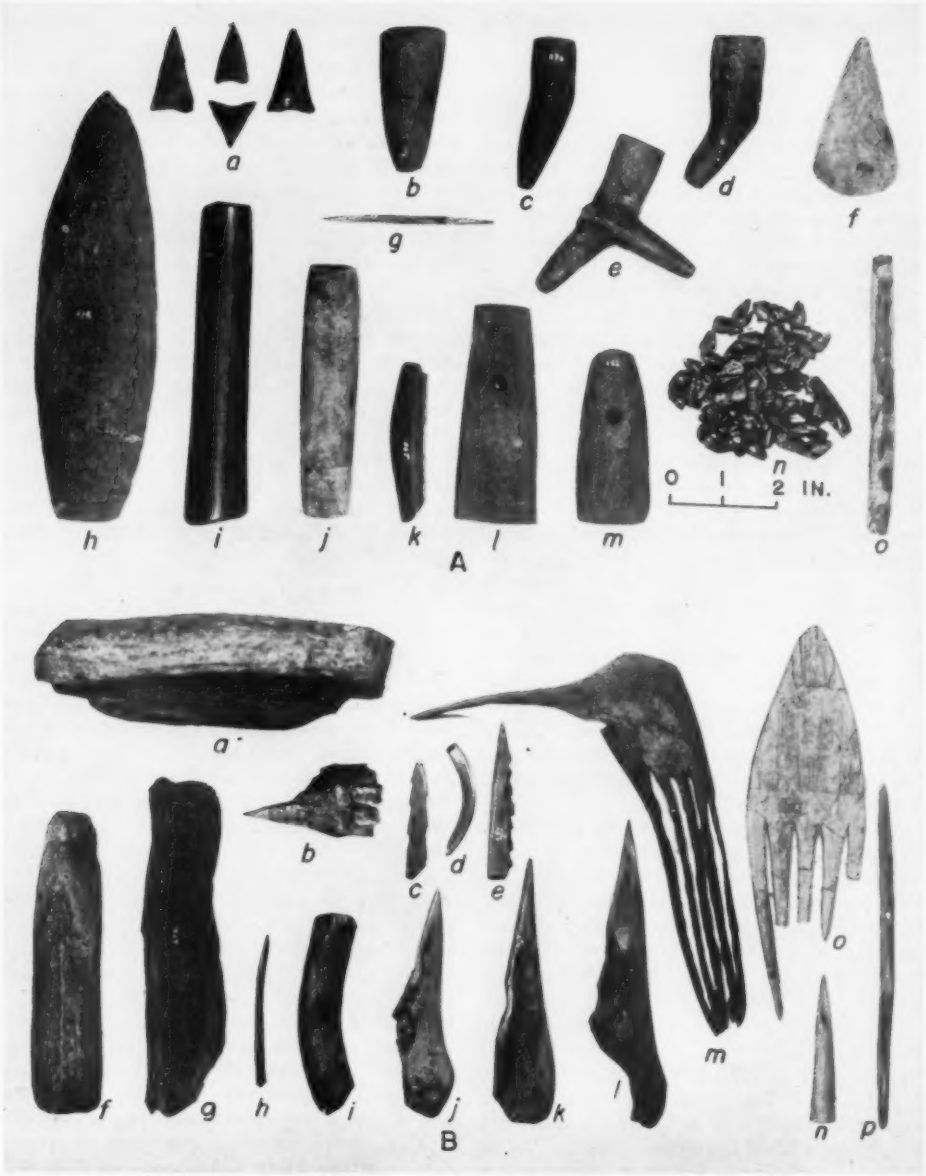

FIG. 93. Artifacts from the Bluff Point mound (*A*, *a*) and Kipp Island (*A*, *b–p*; *B*), western New York. *A*: *b*, *n*, *o*, Grave 1; *c*, *g*, *h*, Grave 3; *d*, *p*, Grave 4; *f*, *k*, Grave 7; *i*, Grave 5; *j*, Grave 8; *l*, *m*, Grave 6. *B*: *a*, *d*, *h*, *i*, *k*, *l*, *n*, Grave 7; *b*, *f*, Grave 8; *c*, *e*, Grave 5; *g*, *j*, *o*, Grave 2; *m*, Grave 6.

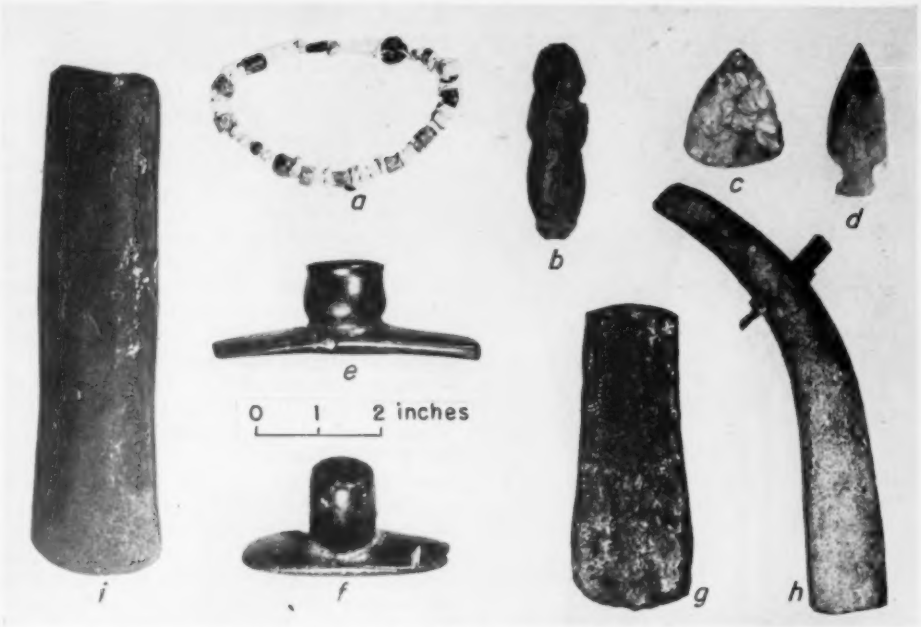

FIG. 94. Artifacts from Bluff Point (*b, c, d, f, h, i*) and Wheatland (*a, e, g*) mounds, western New York.

probably smoky quartz (Fig. 94, *d*), found in the edge of the pit, and second, a hafted beaver incisor with antler handle (Fig. 94, *h*) and two cache blades, the latter three from the edge of the mound and seemingly not directly associated with the first deposit.

About 100 feet south of the mound Messrs. Schoff, Carl Armbruster, and James Ward exposed an additional fifteen to twenty flexed burials, generally in poor condition with an average depth of about 2 feet, and with four exceptions, sterile. One grave produced the extraordinary limestone figurine illustrated in Figure 94, *b*. Another burial had two notched projectile points and a small celt as mortuary offerings, while still a third grave (?) or deposit contained a pentagonal slate pendant illustrated by Ritchie,[5] two to four chalcedony leaf-shaped blades, and a slate gorget, all resting on a sheet of mica and lying in a mass of red paint about 8 inches in diameter, 1 inch thick, and lense-shaped. From the fourth burial was obtained a red slate gorget.

[5] Ritchie, 1944, Pl. 86, *28*.

WHEATLAND MOUND

The remnant of a plow-leveled burial mound on the W. I. Tenny farm, Town of Wheatland, Monroe County, New York, was explored by Mr. Schoff in August of 1931. The tumulus, probably one cited by Parker,[6] lay behind an old log house northeast of Blue Pond, 32 rods from Smith Road, on property formerly owned by Mr. Charles Kargas. In 1920, when Mr. Tenny purchased the land, the mound is alleged to have attained respectable height and to have contained a large formation of stones that were hauled away as the plow exposed them. All that remained in 1931 of what was certainly a sunken central vault were three stone slabs, the largest lying about 6 inches below the surface and covering the other two, which in turn lay a few inches deeper. Between the stones appeared several fragmentary molars, a few pieces of calcined bone, bits of mica, a native copper celt, ten pearl and nine baroque beads, and a bluish-green steatite platform pipe (Fig. 94, *g, a, e*).

[6] Parker, 1922, Pt. 2, p. 611; No. 14 for Monroe County.

FIG. 95. Bone combs from the Bowman mound, Linville, Virginia. (U.S.N.M. catalogue numbers: *left*, 169864; *right*, 169865.)

BOWMAN MOUND

During the years 1891–93 Mr. Gerard Fowke of the Bureau of American Ethnology explored a number of highly interesting tumuli in the James and Potomac valleys of Virginia.[7] Striking parallels between his discoveries and material recovered more recently in the Northeast make it advisable to include photographs of the artifacts from one of these components, the Bowman Mound of Linville, Rockingham County, for though the site has been described elsewhere,[8] the specimens recovered have never been illustrated.

Quite briefly, the excavations disclosed in this plow-reduced mound, measuring 65 by 75 by 3 feet, a nearly circular core, 36 feet in diameter, "filled from the top to fully two feet below the level of the original surface with skeletons and bone-beds in the utmost confusion."[9] Multiple bundle burials constituted the bulk of the inhumations with a lesser number of single interments and deposits of cremated bone "by themselves, or under the bundled skeleton of one or more individuals, or in the middle of a stratum of bones a foot thick, showing no evidence of incineration."[9] Thick ossuary-like "bone-beds" contained almost no mortuary offerings while the single burials were often spectacularly equipped. "This was especially the case of infants, nearly all of whom had been interred with many beads."[10]

Grave goods included the following objects: two enormous classical Point Peninsula style combs, each delicately engraved, the larger being $18\frac{3}{4}$ inches in length (Fig. 95); two small crude pottery jars, the first (Fig. 96, *a*) gray to black in color with smoothed interior and a "slashed" surface treatment on the outside, the second (Fig. 96, *b*) tan to brown in color, smoothed within and apparently malleated on the exterior with a cord-wrapped paddle edge. Both jars show distinct coil ridges on the interior. In addition twelve potsherds were recovered, all markedly similar and differing almost solely in thickness, smoothed within but showing faint fabric impressions, grit-tempered,

[7] Fowke, 1894.

[8] Fowke, 1894, pp. 37–44; Ritchie, 1944, pp. 120–1.

[9] Fowke, 1894, p. 38.

[10] *Ibid.*, p. 44.

FIG. 96. Pottery vessels (*a*, *b*) and shell dipper (*c*) containing Marginella beads, Bowman mound, Linville, Virginia. (U.S.N.M. catalogue numbers: *a*, 169869; *b*, 169877; *c*, 169873.)

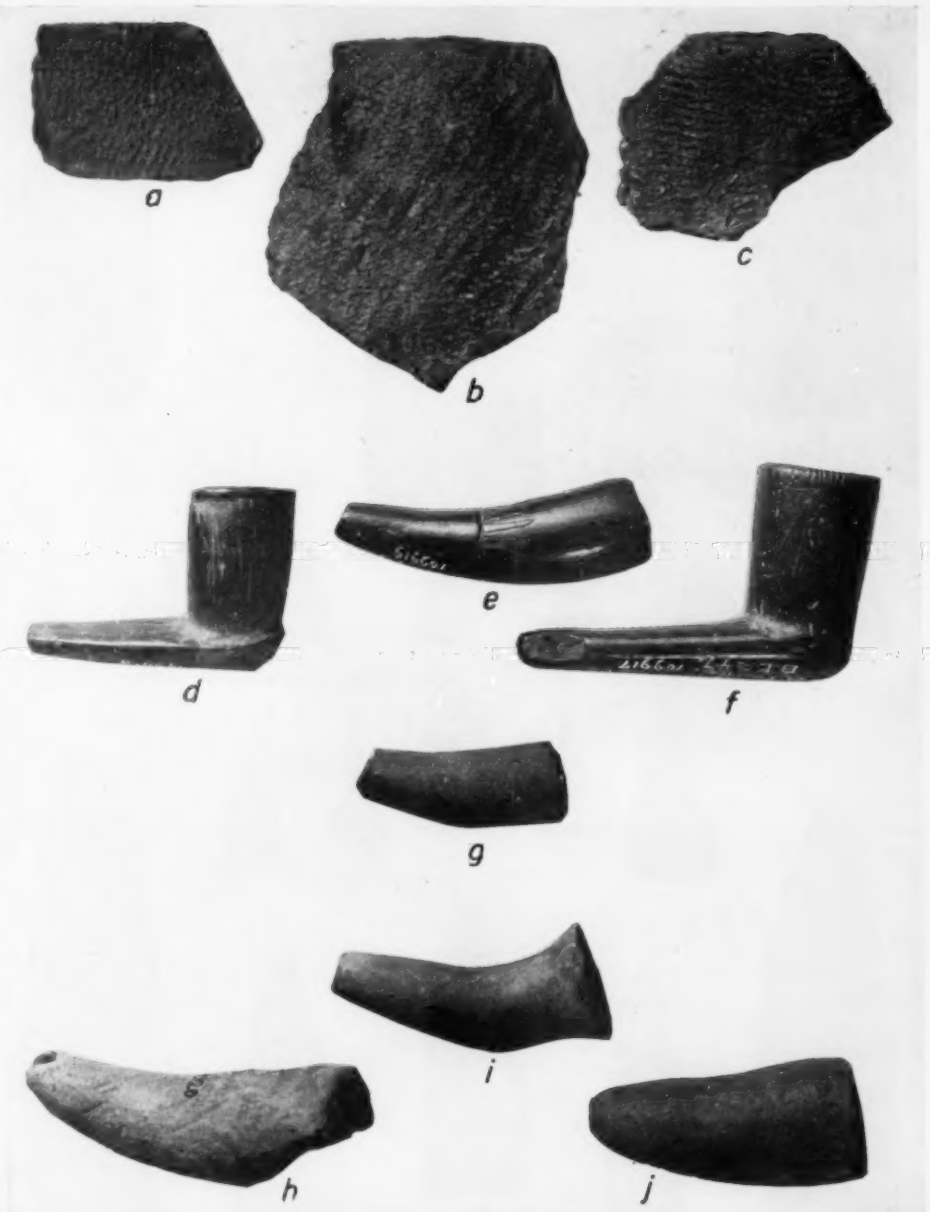

FIG. 97. Potsherds and pipes from the Bowman mound, Linville, Virginia. (U.S.N.M. catalogue numbers: *a–c*, 169876; *d*, 169917; *e*, 169919; *f*, 169918; *g*, 169920; *h*, 169923; *i*, 169922; *j*, 169921.)

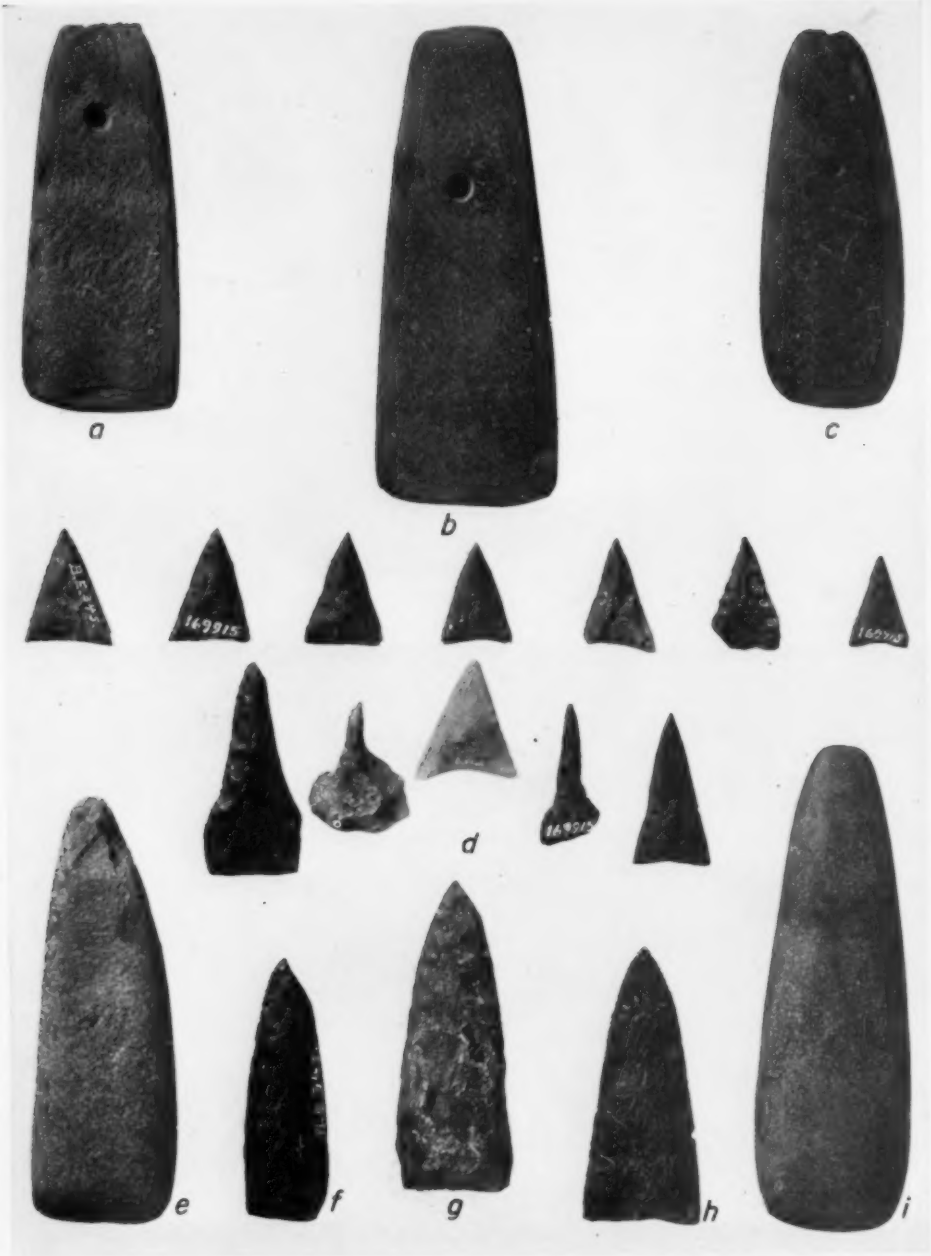

FIG. 98. Stone artifacts from the Bowman mound, Linville, Virginia. (U.S.N.M. catalogue numbers: *a*, 169867; *b*, 169891; *c*, 169924; *d*, *g*, *h*, 169915; *e*, 169990; *f*, 169908; *i*, 169888.)

largely with quartz, from a straight-sided vessel with an undecorated rim (Fig. 97, *a-c*). Fowke mentions the discovery of a total of nine pipes, including a pair of platform pipes. These latter are not in the U. S. National Museum, nor were they ever catalogued with the remainder of the collection. The other seven are shown in Figure 97. Specimen (*d*) is a flat-based platform pipe that has been broken and then polished down.

Three slate pendants were uncovered (Fig. 98, *a–c*). Specimen (*a*) has the serrated top edge so frequently seen in artifacts of this type. Nearly all of the chipped stone pieces, with the exception of eleven blades similar to (*f*), are shown in this same figure. Note the green-stone celt (*e*) and adze (*i*). Not shown are quantities of red and yellow ocher, some of the first-mentioned in the form of hematite chunks.

Shell articles were numerous but not varied. About 200 long conch columella beads were recovered (Fig. 99, *b*), as well as smaller varieties from the same source (Fig. 99, *c*, *d*); thousands of drilled columella beads (Fig. 96, *c*, *d*); a pendant made from mussel shell and another of conch (Fig. 99, *e*, *a*), although the latter is of uncertain provenience and actually may not belong to this site. Finally, a worked conch shell containing the Marginella beads was uncovered as shown in Figure 96.

Of the thirty-odd bone and antler specimens discovered, the majority are illustrated in Figure 100. Note the five deer ribs with long edges ground and pointed ends (*a*, *g*, *k*); deer rib bodkin (*i*); antler projectile point with tang (*j*); burned elliptical bone section, allegedly of human skull (*b*); and antler flaking tools (*c*, *e*). Not illustrated are panther claws, bear skull and another from a rodent, hammerstone and whetstone, and seven quartz crystals with one grooved for suspension.

In other mounds excavated by Fowke in this general area grave goods included the gorget and pendant, mica, galena, curved and straight-based platform pipes, pentagonal pendant, copper crescent, cup-like cone, and so forth. It is interesting to note that certain of these tumuli were small cairns, others were constructed with both boulders and earth, while the majority were simple earth mounds.

REMARKS

It will suffice to state that a measure of coevality of the fundamentally related Middlesex, Hopewellian, and Point Peninsula complexes is demonstrated at both Kipp Island and Bluff Point. Analysis of the mortuary furnishings at the former reveals such characteristic Middlesex traits as the blocked-end tube, large blade approaching the "willow-leaf" type (intentionally mutilated or preserved after accidental breakage?), bone gouge, and square copper awl. In several cases, for example Grave 5, these lay side by side with diagnostic Point Peninsula specimens. All of the graves, I believe, belong to a single cultural unit and must be referred to the same horizon as the adjoining Point Peninsula cemetery and simple mound (?) reported by Ritchie.[11] This makes the Mid-

FIG. 99. Shell artifacts from the Bowman mound, Linville, Virginia. (U.S.N.M. catalogue numbers: *a*, none; *b*, 169926, 169904, 169894, 169866; *c*, 169862; *d*, 169899; *e*, 169927.)

[11] Ritchie, 1944, pp. 132–43.

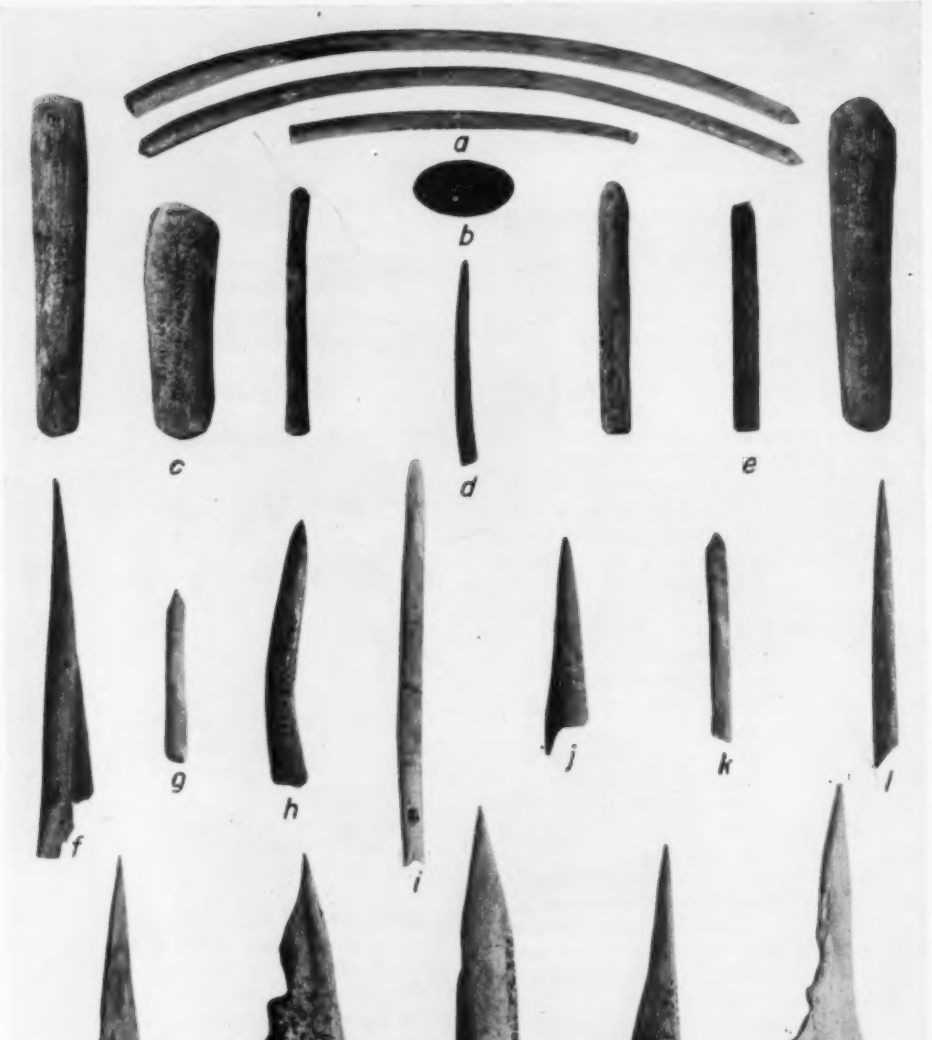

FIG. 100. Bone and antler artifacts from the Bowman mound, Linville, Virginia. (U.S.N.M. catalogue numbers: *a*, 169870; *b*, 169874; *c*, 169892, 169898, 169870; *d*, 169887; *e*, 169892, 169913, 169892; *f*, *l*, 169892; *g*, *k*, 169870; *h*, 169884; *i*, 169863; *j*, 169225; *m*, 169905; *n*, 169898; *p*, *o*, 169925; *q*, 169898.)

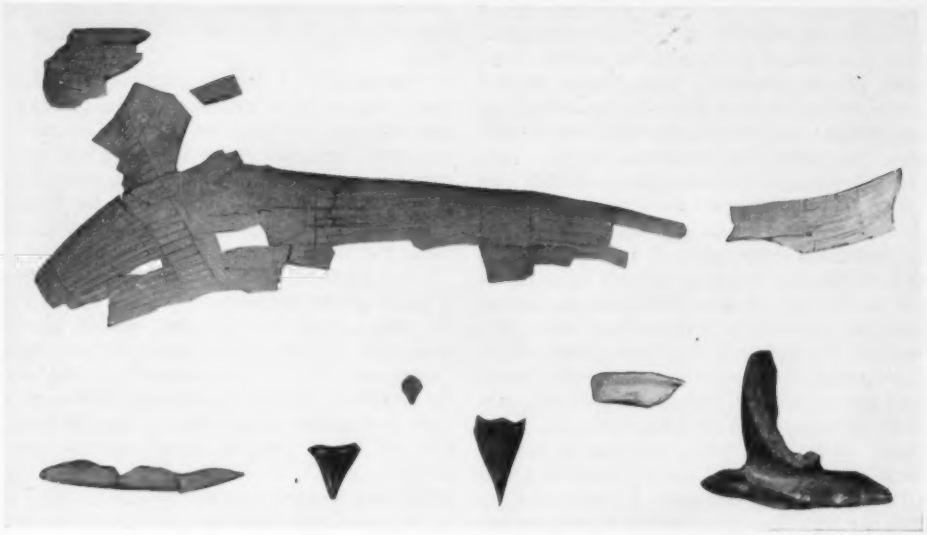

FIG. 101. Bone comb, other bone fragments, perforated shark's teeth, and a steatite platform pipe from a site north of the Rosenkrans cemetery, Sussex County, New Jersey.

dlesex traits here doubly interesting, for fictile types from the adjacent Point Peninsula village site suggest a late focus of that aspect.

Unfortunately, definite associations at Bluff Point are obscure. No diagnostic artifacts occurred with the Hopewell-like figurine, and the relationship of the hafted beaver incisor to the mound is indefinite. Artifacts from the Wheatland mound, on the other hand, are all characteristic of the Northeastern Hopewellian manifestation and again include the copper celt and pearl bead, both frequent Genesee Valley mound traits.

A few generalizations about the Rosenkrans cemetery. The artifacts reveal a comparatively "pure" Middlesex station although it should be noted that well over half of the objects would be equally at home on Point Peninsula or Hopewellian sites. At least one classical late Point Peninsula comb is reported from this same county, allegedly from a site to the north. The specimen, now in the possession of Mr. Charles A. Philhower, through whose courtesy Figure 101 was obtained, was found in a calcined condition associated with calcined bone fragments, two perforated shark's teeth, and a fragmentary steatite platform pipe of straight-based form, as shown in Figure 101.

While at certain stations the Middlesex complex appears inseparably blended with Hopewell and Point Peninsula, in New England it is more frequently seen as a distinct entity. For a brief but brilliant period this mortuary tradition seems to have flowered in the area and developed such pronounced areal peculiarities that a search for western origins, or at least a parallel complex, may prove difficult.

However, I do not regard as coincidental the facts that the Beech Bottom mound, with its remarkable abundance of stone tubes and red ocher, lies to the north on the upper Ohio;[12] and that extensive tube-bearing sites occur at Tionesta, Hunter's Station, West Hickory, Kinzua, and Sugar Run, along the Allegheny River and at Kennedy, Chautauqua County, New York. There is at least the suggestion here that part of the Middlesex tradition was introduced by an actual migration stemming out of the northern Mississippi Valley and sweeping northeast via the Ohio and Allegheny rivers. We cannot ignore the very real possibility that late Adena or some other manifestation thereby introduced into the Northeast horticulture, pottery, possibly a greater emphasis upon fish

[12] Bache and Satterthwaite, 1930.

and shell food,[13] and perhaps an entire religious and mortuary complex which must have undergone pronounced changes in its new environment. From Allegheny Valley sites of this period, collectors have annually gleaned an unprecedented number of tubes and varied gorgets, including the expanded center type, grooved axes, bolas-stones, hoes, Adena- and Laurentian-like chipped stone pieces. At least three pottery styles occur: Vinette I; a thick, flat-bottomed ware, which is in the minority; and, in greatest frequency, sherds identical to Vinette I except for smoothed interiors. Several hundred complete or fragmentary tubes, the majority blocked-end, are recorded from these valley stations. None have the expanded base, most are quite thick, and all are made of pipestone or slate. The thin, expanded-base, limestone, blocked-end tube, so characteristic of Middlesex graves in New England and the Atlantic littoral, is unknown. Other than this, little can be ventured, for scientific excavation of these stations has been limited. Here is a problem that future archaeologists working in the Allegheny Valley might profitably keep in mind.

Though the evidence at hand is still meager, there is also the interesting possibility that a second and later Middlesex migration moved eastward into Tidewater Virginia[14] and then north along the Atlantic seaboard, extending, incidentally, as far north as coastal Maine where on the Mason site it was intrusive into a "Red Paint" (late Laurentian?) deposit.[15]

Finally, the distant Bowman mound in Virginia presents an interesting case. While in the past mounds have not been directly identified with the Point Peninsula Aspect, such components do exist and will be described by the writer at a future date. Clearly this complex is of considerable temporal and spacial distribution, for it can hardly be denied that the Bowman mound is as typical a Point Peninsula site as has ever been described.

[13] Ritchie (1932) notes this same feature in the late component at Lamoka.

[14] Weslager, 1942. A large number of blocked-end tubes from Virginia are in the U. S. National Museum.

[15] Moorehead, 1922, pp. 46–9.

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Indiana Historical Society
Indianapolis, Indiana
July, 1949

THE WARE SITE, SALEM COUNTY, NEW JERSEY

CATHERINE MCCANN

THE Ware site is located in the northern part of Salem County, southwestern New Jersey, on the farm of Mr. Lee Ware. It is on the south bank of Salem Creek, extending to within about 100 feet from the creek, a location which would be flooded only in times of especially high water. The total extent of the site is not known, but it occupies an area of at least 400 feet by 150 feet. It is rather thickly wooded in places, with a mixed growth of cedars, hickory, dogwood, several species of oaks, and a variety of other trees, The soil is, in general, light and sandy.

Excavation was begun in the autumn of 1947 and continued in the summer of 1948.[1]

POTTERY TYPES

Two principal pottery complexes, plus several minority types, can be distinguished at this site.

I. The most abundant was the Riggins pottery, which can tentatively be divided into three types: Riggins Fabric-impressed,[2] Riggins Plain, and Indian Head Incised. There is no doubt that these pottery types are culturally associated, as they have been found together repeatedly at sites previously excavated in southern New Jersey. Indian Head Incised may be less intimately associated with the other two types than they are with each other, but it also occurs at the same sites, and there seems to be at least considerable overlapping in time.

1. Riggins Fabric-impressed is a very common type in southwestern New Jersey (Fig. 102, *a–c*). The fabric impressions apparently were not made with a fabric-wrapped paddle, as they extend without a break over large curved surfaces. It seems more likely that a fabric was wrapped carefully around the outside of the vessel. This type is usually a rather thin, well-made pottery with no visible tempering. Pottery of this type at the Ware site differs from that at most other sites in being somewhat coarser, with fragments of quartz temper up to 4 mm. in diameter. It is also a little thicker than at most other sites (about 5–7 mm. at the Ware site). The color, at this and other sites, is usually buff, but is occasionally a light or dark gray or a reddish shade.

Fabric impressions are the usual surface finish, but on a few body sherds the impressions are regular but spaced about one-fourth inch apart, suggesting the use of the cord-wound stick. Over this as well as over the usual surface finish there seems to have been a secondary smoothing, so that the impressions are blurred and partially obliterated. Sometimes this type is smoothed to such an extent that only faint impressions are left and at first glance it may be taken for a plain ware.

This type is usually undecorated except at the lip. A cord-wound stick, the edge of a cord-wrapped paddle, or some similar instrument was usually applied transversely across the lip. Other decoration, when it occurs, consists of cord-wound stick impressions, single twisted cord impressions, punctation, sometimes of the hollow reed variety, and incised lines. Designs are simple, consisting usually of a few vertical or horizontal lines.

The most common shape is ovate with the smaller end at the bottom. Some vessels have a straight neck rising above an ovate body. Rims are usually straight, but are occasionally slightly everted or incurved. Bases are rounded to conoidal, at the Ware site usually rounded.

2. Riggins Plain is very similar to Riggins Fabric-impressed in all respects except surface finish (Fig. 102, *d–f*). It is possible that this type represents a variant of Riggins Fabric-impressed in which the secondary smoothing has been carried so far that the fabric impressions have been entirely obliterated. The paste is similar to that of Riggins Fabric-impressed, and the paste of the Ware site sherds shows the same greater coarseness and abundance of temper over that at other sites as does that of the Fabric-impressed sherds. Shapes seem to be similar to those of Riggins Fabric-impressed.

Decoration on Riggins Plain is similar to that on Riggins Fabric-impressed but is somewhat more common. About one-half of the Riggins Plain rim sherds at the Ware site bore decoration other than the transverse impres-

[1] This work was undertaken as a project of the Indiana Historical Society, under the sponsorship of Dr. Dorothy Cross, Archaeological Adviser to the State of New Jersey.

[2] The terminology here has been changed from that of Cross (1941), who refers to this surface finish as cord-wound stick impressed.

sions on the lip, while only about one-fifth of the Riggins Fabric-impressed rim sherds had such decoration.

3. Indian Head Incised is the least abundant of these three related types (Fig. 102, *g–i*). The paste is uniformly fine, even at the Ware site, and no tempering is visible. The surface is well smoothed and is almost always a rather dark gray.

Decoration is by incision. The incised lines are rather narrow (1 mm. or a little less) and quite uniform in width and depth. Designs consist of rather elaborate arrangements of horizontal, vertical, and oblique lines.

There seems to be considerable variation in the shapes of these vessels. Some sherds seem to represent vessels of the ovate shape common in the Riggins types. Parts of two small vessels found at the Indian Head site[3] were of similar shape but with a slightly flaring rim. Three sherds of a single vessel found at the Ware site indicated a markedly different shape, a collared vessel. The collar was no thicker than the rest of the vessel and was formed by a convexity above the neck, the rim being inturned. The neck was sharply constricted and the diameter of the body increased rapidly below it.[4]

II. The second pottery complex consists of flat-based wares, as follows.

1. Koens-Crispin Plain is a thick, steatite-tempered ware with a plain, rough surface. Bases are flat, slightly offset, and circular to quadrangular. The sides expand to a wide mouth, and the rim is plain, rounded, and sometimes slightly tapered. This type has been described and illustrated by Cross[5] and is very similar to Marcey Creek Plain.[6] At a much earlier date Holmes had also mentioned steatite-tempered pottery, remarking on its association with steatite vessels.[7]

2. Ware Plain is similar in shape and in surface finish to Koens-Crispin Plain but is not steatite-tempered. Some sherds are tempered with small (1 to 2 mm. diameter) fragments of dark gray limestone; more often no tempering material is visible. The only decoration ob-

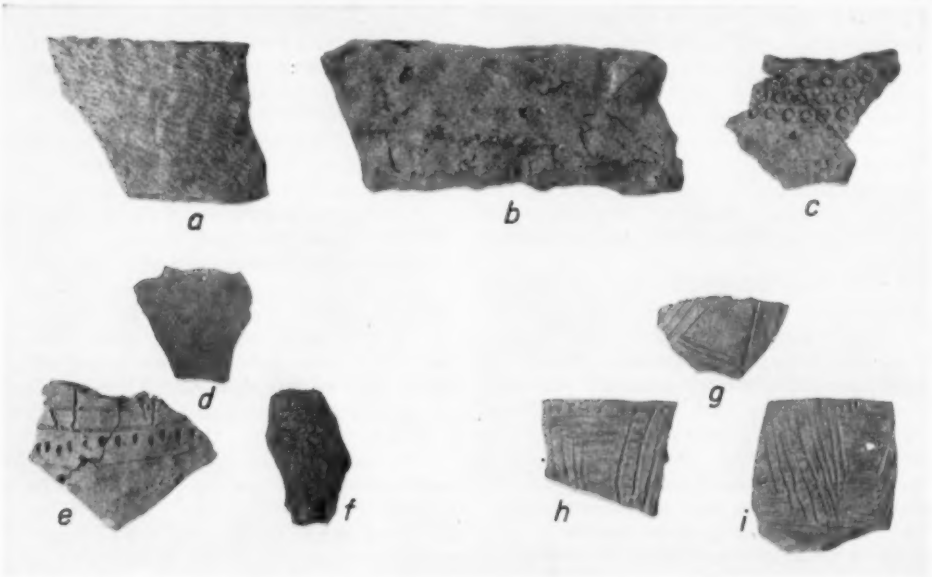

FIG. 102. Sherds of the Riggins types, Ware site, New Jersey: *a–c*, Riggins Fabric-impressed; *d–f*, Riggins Plain; *g–i*, Indian Head Incised.

[3] Cross, 1941 Pl. 12, *a*.

[4] For an illustration of a similar collar but with less extreme curvature, see Rouse, 1947, Fig. 3, *G*.

[5] Cross, 1941, pp. 60, 65–6; Pls. 24 and 26.

[6] Manson, 1948, p. 226.

[7] Holmes, 1903, p. 157.

served was the very infrequent decoration of the lip with small transverse cuts, spaced 3/16″ to ¼″ apart. This pottery type formed the bulk of the flat-based ware at the Ware site.

3. A few sherds were found at the Ware site of a pottery type which seems to be similar to Ware Plain in all respects except surface finish. There are rather faint coarse cord impressions on the outer surface.

It is possible that these three types form a sequence, but the material was not abundant enough to indicate whether this is true.

III. The following miscellaneous pottery types were found.

1. The most common of the minority types, especially in Area A, was a coarse, cord marked ware with straight rim and conical base. It is characterized by heavy, parallel cord impressions which seem to be placed almost vertically, judging from rim sections. There is very little cross-stamping on this type. For convenience it will be referred to here as Ware Cord-marked.

2. There were a few cord-marked sherds which were sufficiently different in appearance from Ware Cord-marked so that they were not included in that group. The difference consisted mainly in a greater degree of cross-stamping.

3. A few sherds had impressions of a fabric of a weave similar to that of Riggins Fabric-impressed but appear not to belong to that type. They are slightly thicker, have a coarser paste and deeper impressions, and do not show the secondary smoothing which is characteristic of the Riggins type.

4. There were a few sherds which might be regarded as transitional between Ware Cord-marked and Riggins Fabric-impressed. They have parallel impressions of cord-marking with little cross-stamping, like Ware Cord-marked, but the paste is more like that of the Riggins type, and the impressions have been partially smoothed over.

EXCAVATIONS

Exploratory trenches showed no apparent physical stratification other than the humus line, so excavation was carried on in 5-foot squares with arbitrary 3-inch levels. Some areas tested showed considerable modern disturbance and in others aboriginal material was found to only shallow depths, so it was decided to concentrate on three areas which were comparatively undisturbed and which yielded material to a depth of at least 18 inches.

The first of these, Area A, at the eastern end of the site, comprised 260 square feet and furnished a sample of 527 sherds. This area had probably never been plowed, and the humus was only 2 to 3 inches deep. Below it was about 15 inches of mottled yellow sand, the main zone of occupation, and below the sand was gravel of undetermined depth. The principal pottery types in this area were the Riggins wares and Ware Cord-marked. The results of excavation are shown in Table 40.

Area B was about 150 feet northwest of Area A. It was 625 square feet in surface area and yielded 1,258 sherds. It has not been cultivated in recent years but was probably plowed at some time. The humus here is 9 to 10 inches deep, underlain by yellow sand to a depth of at least 2 feet. The area may be divided vertically into a humus level (surface to 9″), an intermediate or transitional level (9–12″), and a subsoil level (12–24″). The Riggins types and flat-based pottery were pre-

TABLE 40. DISTRIBUTION OF SHERDS BY TYPE AND LEVELS, AREA A

Level	*Number of Sherds*						*Percentages*				
	Riggins Types	*Ware Cord-marked*	*Flat-based Types*	*Miscellaneous*	*Uncertain*	*Total*	*Riggins Types*	*Ware Cord-marked*	*Flat-based Types*	*Miscellaneous*	*Uncertain*
0– 3″	54	2			5	61	89	3			8
3– 6″	146	12		2	15	175	83	7		1	9
6– 9″	124	7		3	11	145	86	5		2	8
9–12″	79	34		2	6	121	65	28		2	5
12–15″	11	4	2	1	4	22	50	18	9	5	18
15–18″		1			1	2		(50)*			(50)
18–21″			1			1			(100)		

* Percentages are placed in parentheses when numbers are extremely small.

TABLE 41. DISTRIBUTION OF SHERDS BY TYPES AND LEVELS, AREA B

Level	Number of Sherds					Percentages			
	Riggins Types	Flat-based Types	Miscellaneous	Uncertain	Total	Riggins Types	Flat-based Types	Miscellaneous	Uncertain
Humus	895	3	29	67	994	90	*	3	7
Transitional level (9"–12")	138	7	10	22	177	78	4	6	12
Subsoil	19	48	5	15	87	22	55	6	17

* Indicates less than one-half of one per cent.

dominant here, while Ware Cord-marked was very scarce. The distribution of pottery by levels in this area is shown in Table 41.

Two small pits were found in Area B. The first was about 12 inches in diameter and extended down from the humus to a depth of 23 inches, tapering toward the bottom. It contained only fire-cracked stones and a broken flint pebble. The other, which also originated in the humus, was irregular in shape. Its diameter at a depth of 12 inches was 38 inches, while at the 21-inch level it was only about 8 inches in diameter. Its total depth was 29 inches. This pit contained 186 sherds, most of which seem to belong to one vessel. The vessel, which has been partially reconstructed, is of the Riggins Fabric-impressed type. A fragment of an aboriginal clay pipe and a few jasper and quartz chips were also found in the pit.

Area C, about 50 feet west of the western end of Area B, was 225 square feet in area; 254 sherds were found there. The humus line was quite uniformly at nine inches. The distribution of pottery types was quite similar to that of Area B (see Table 42).

TABLE 42. DISTRIBUTION OF SHERDS BY TYPES AND LEVELS, AREA C

Level	Number of Sherds					Percentages			
	Riggins Types	Flat-based Types	Miscellaneous	Uncertain	Total	Riggins Types	Flat-based Types	Miscellaneous	Uncertain
Humus	180	1	1	32	214	84	*	*	15
Transitional level (9"–12")	14	7	3	5	29	48	24	10	17
Subsoil	1	9	1	—	11	9	82	9	—

* Indicates less than one-half of one per cent.

ARTIFACTS

Artifacts other than sherds were not especially numerous; they are listed in Table 43. All were of stone or pottery, with the exception of a small piece of probably worked shell found in an exploratory trench and not listed in Table 43. There were no bone implements and only a few small and unidentifiable fragments of animal bone were found on the site. This fact may indicate an acid condition of the soil, which would also account for the absence of skeletal material.

Projectile points were the only class of implements which were abundant enough so that the vertical distribution of the various types seemed significant. The dimensions and proportions of these types are shown in Table 44. The types may briefly be described as follows:

1. Small equilateral triangular points with straight or concave bases. Materials are usually flinty (crypto-crystalline quartzes) or "Cohansey quartzite," a local material said by geologists to be actually a conglomerate. Quartz and argillite are infrequently used as material for this type of point.

2. Isoceles triangles with straight or concave bases. The usual materials are flints or quartz.

3. Convex-based triangles, sometimes called "tear-drop" points. They are made of flinty materials or quartz.

TABLE 43. ARTIFACTS OTHER THAN POTTERY

	Area A			*Area B*			*Area C*		
	0–9″	*9–12″*	*12–21″*	*0–9″*	*9–12″*	*12–24″*	*0–9″*	*9–12″*	*12–18″*
Projectile points									
Equilateral triangular	1	1		6	2		5		
Isoceles triangular	1			1		1			
Convex-based triangular				1		3			
Side-notched triangular			1			1			
Side-notched lanceolate					1	2	1		1
Plain-stemmed			1		1	9			1
"Fish spear"						3			1
Lozenge-shaped					1	1			
Short-stemmed, barbed									1
Broken (tips, etc.)			1	2		4	1	1	
Unfinished and rejects		1		2		3			
Blades									
Triangular						2			
Broken				1		1			
Scrapers									
Utilized flake	1			1					
End					1	1			
Side			1			3		1	
Broken					1	1			
Drills									
Triangular, jasper				1					
Convex-based, shale						1			
Blanks						2			
Chipped oval, argillite	1								
Disk, sandstone				1					
Pitted stone (mortar?)					1				
Hammerstone, single-pitted						1			
Cylindrical pestle (fragment)					1				
Hone or pottery smoother						1			
Pipe sherds									
Plain	1			3	2	3			
Incised				2					
Non-aboriginal object (seal?)				1					

4. Side-notched triangles of flinty materials.

5. Side-notched points of lanceolate shape. Materials are shale, argillite, quartz, quartzite, and Cohansey "quartzite."

6. Plain-stemmed points of shale, argillite, and quartz. Cohansey "quartzite" and true quartzite occur infrequently as materials. Projectile points of this type at other site sometimes run much larger than the dimensions given in Table 44.

7. "Fish spears" of shale. The specimens found at the Ware site are rather short, compared to many points of this type, but there seems to be no break between them and the longer specimens. They are plain-stemmed or side-notched, but may be distinguished from other types by their proportions: they are narrow in proportion to length and thick in proportion to breadth. The blade is usually ridged, so that the cross section is triangular or lozenge-shaped.

8. Lozenge-shaped points of flinty materials

TABLE 44. DIMENSIONS AND PROPORTIONS OF PROJECTILE POINT TYPES, WARE SITE

Type	Dimensions (in Inches)			Proportions	
	Length	Breadth	Thickness	Breadth–Length	Thickness–Breadth
1. Equilateral triangular, straight or concave base	¾–1¼	¾–1¼	3/16–⅜	⅝–1¼	⅛–⅓
2. Isosceles triangular, straight or concave base	⅞–1⅜	½–1	⅛–5/16	½– ¾	⅛–⅖
3. Convex-based triangular	1 –1½	⅝–1	¼–⅜	½– ⅝	¼–½
4. Side-notched triangular	⅞–1⅝	¾–1	¼–⅜	⅝– ⅞	⅛–⅓
5. Side-notched lanceolate	1½–3	½–1½	¼–½	3/16– ⅝	⅛–½
6. Plain-stemmed	1¼–1½	⅝– ⅞	¼–⅜	½– ⅝	⅛–½
7. "Fish spear"	1⅝–2½	½– ¾	5/16–⅜	½– ⅔	½–¾
8. Lozenge-shaped	1¼–1½	¾	¼–⅜	½– ⅔	⅓–½
9. Short-stemmed barbed	1 5/16	11/16	¼	(0.62)	(0.31)

or quartz. They are rather rare at New Jersey sites.

9. A single example of short-stemmed barbed point. The sides are slightly convex, and sharp barbs extend beyond the base of the stem. This specimen is of quartzite, but specimens of this type made of flinty materials have occasionally been found at New Jersey sites.

at comparatively shallow depths, eight of the eleven found being above 12 inches, and six above 9 inches. Both the incised fragments were in the humus.

An artifact not included in Table 43 was a sherd of a steatite bowl found in an exploratory trench near Area A. It occurred at a depth of 17 inches, about an inch below the surface

TABLE 45. VERTICAL DISTRIBUTION OF STONE MATERIALS USED FOR ARTIFACTS

	Area A			Area B			Area C		
	0–9"	9–12"	12–21"	0–9"	9–12"	12–24"	0–9"	9–12"	12–18"
Flinty materials	2	2	1	13	1	7	5	2	1
Cohansey "quartzite"	1			1		1	1		
Quartzite					1	4			1
Quartz			2		2	4	1		1
Argillite and shale	1			1	3	21			2
Sandstone				1	2	2			
Unidentified						1			

The equilateral triangular points were found mainly in the upper levels. All of the fifteen specimens were above 12 inches, eleven of them above 9 inches. Four of the five side-notched lanceolate points were found below 9 inches, three of them below 12 inches. All of the four "fish spears" and all but one of the twelve plain-stemmed points were below 12 inches, the single exception being in the transitional level. Side scrapers were also found mainly in the lower levels. One was in the 9–12 inch level, or immediately below the humus, but the remaining four were below 18 inches.

Sherds of aboriginal pottery pipes occurred

of the gravel underlying this area.

One artifact probably dated from the period of European contact. This was a small rectangular object of lead, apparently a seal, with an unidentified crest on one side. Small lead seals are said to have been used as identification marks on packs of furs.[8]

The vertical distribution of stone materials was similar to that usually found at southern New Jersey sites, artifacts made of flinty materials being at comparatively shallow depths

[8] Pennsylvania Historical and Museum Commission, 1947, p. 5.

and those of shale and argillite at greater depths. At this site the depths of objects of quartz was almost equal to that of those made of argillaceous materials. The vertical distribution of the materials used for artifacts is shown in Table 45.

SUMMARY

The vertical distribution of types of pottery and other artifacts seems clear enough to justify the conclusion that at least two components, perhaps widely separated in time, are represented at this site. The late component is represented by the material found mainly in the humus levels or above 9 inches; the early component by the material characteristic of the levels below 12 inches. The level immediately below the humus (in Areas B and C), or from 9 to 12 inches, may be regarded as either transitional or mixed; the latter seems more probable.

The early component (or components) is characterized by plain, thick, flat-based pottery, stemmed and notched projectile points, large triangular blades, side scrapers, and the predominant use of argillaceous materials and quartz for implements. Some of these implements, such as the stemmed and notched points, seem to have been in use in New Jersey for a long period of time, as they are found with a number of pottery types which probably were not contemporaneous. Thus the material in the lower levels may represent a long period of time, with internal development and replacement, and it is doubtful whether it should be regarded as a single component.

The material in the upper levels is more homogeneous. The late component is characterized by pottery of the Riggins types, plain and decorated pottery tobacco pipes, small equilateral triangular arrowheads, and the predominant use of flinty materials for chipped implements. It is likely that this component represents the prehistoric culture of a southern branch of the Delaware tribe.

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ARCHAEOLOGICAL INVESTIGATIONS IN THE REGION ABOUT LAKES MISTASSINI AND ALBANEL, PROVINCE OF QUEBEC, 1948

EDWARD S. AND MURRAY H. ROGERS

DURING the summer of 1948, from June 14th to September 25th, the authors made a second archaeological expedition into the area including Lakes Mistassini and Albanel in south-central Province of Quebec. The work was directed by Frederick Johnson and done under the auspices of the Peabody Foundation, which provided half of the funds necessary. The Viking Fund of New York City generously granted the remainder of the money necessary and for this both we and the Foundation wish to express our gratitude.

Traveling in the trackless interior of Quebec presents many difficulties at best, and without the generous cooperation of the Hudson's Bay Company and its personnel, travel would be virtually impossible. We are sincerely grateful to Mr. and Mrs. Fred McLeod, Mr. and Mrs. Gerald Parsons, and Mr. and Mrs. Wilfred Jeffreys, whose hospitality and genuine good will are in keeping with the best traditions of the Hudson's Bay Company. We also wish to record our thanks to Mr. Emmett McLeod of Lake Mistassini for his interest and assistance, as well as to the presonnel of the Department of Transport at Lac Dore. To Mr. Douglas S. Byers, Director of the R. S. Peabody Foundation for Archaeology, we are indebted for the unstinted use of facilities for study and for use of certain specialized equipment in the field. We acknowledge a deep debt of gratitude to Mr. Frederick Johnson of the Peabody Foundation. His friendly interest has greatly stimulated our efforts and his constructive criticism has been of invaluable assistance in the preparation of this report.

Starting from Oskelaneo River, Quebec, (Fig. 103, *A*), we retraced the route followed in 1947 as far as the Temiscamie River. The Te Te Pisca River was then ascended to Lake Tournemine (Fig. 103, *C*). On the return trip the east coast of Lake Albanel was surveyed to its southern end, after which our steps were retraced to Lake Obatogamau. From here the route led east through Lake Ducharme, Scatsi River, and Lake Potrincourt and then south and west to Lake Dubois and Gouin Reservoir to Oskelaneo.

During the summer 121 prehistoric sites were discovered. These sites, similar in character to those described previously,[1] are all situated on the shores of rivers or large lakes (Fig. 103). They have been eroded by wave, ice, and current action, so that on some 34 only a few chips remain as evidence of former occupation.

Usually the material was distributed for distances between 25 feet and 100 yards along a sandy or pebbly beach and from a low bank out several feet into the water. Site 90 was an exception; here a few artifacts were scattered along a beach one-half mile long. Also, long rocky beaches on Lake Mistassini produced artifacts. At Sites 21, 22, and 100, chips were found in portage trails some distance from the water's edge. Sites 56–58 were located on banks in places 6 to 8 feet above water level. At Site 72 there was a bank 4 to 6 feet high. Site 33, where present day Indians claim to have camped since time immemorial, and Site 34 were on sandy banks 15 to 20 feet high. The foot of these banks was but a few feet from the water's edge. The land in back of these banks is comparatively flat and dry except at Sites 36, 67, 70, 87, 93, and 94, where it is low and swampy. The exposures of these sites are the same as those found in 1947 except that a disproportionately larger number of sites faced south and southwest. Modern Indian camps were found on 36 per cent of the sites.

Site 78 was located on a level spot 2 to 4 feet above the Temiscamie River. The bank along the river dropped directly into the water except in the eastern part where there were narrow sandy beaches. The site was apparently used extensively as a workshop. The abundance of chips and artifacts were distributed for about 100 feet along the shore between the water's edge and points 20 to 25 feet into the river. The material near shore was covered by a thin layer of sand which had washed from the bank; further out it was covered with an inch of silt. Nowhere was the water more than 3 feet deep.

A dam on the St. Maurice River has flooded numerous lakes to form Gouin Reservoir. In-

[1] Rogers and Rogers, 1948, pp. 85–9.

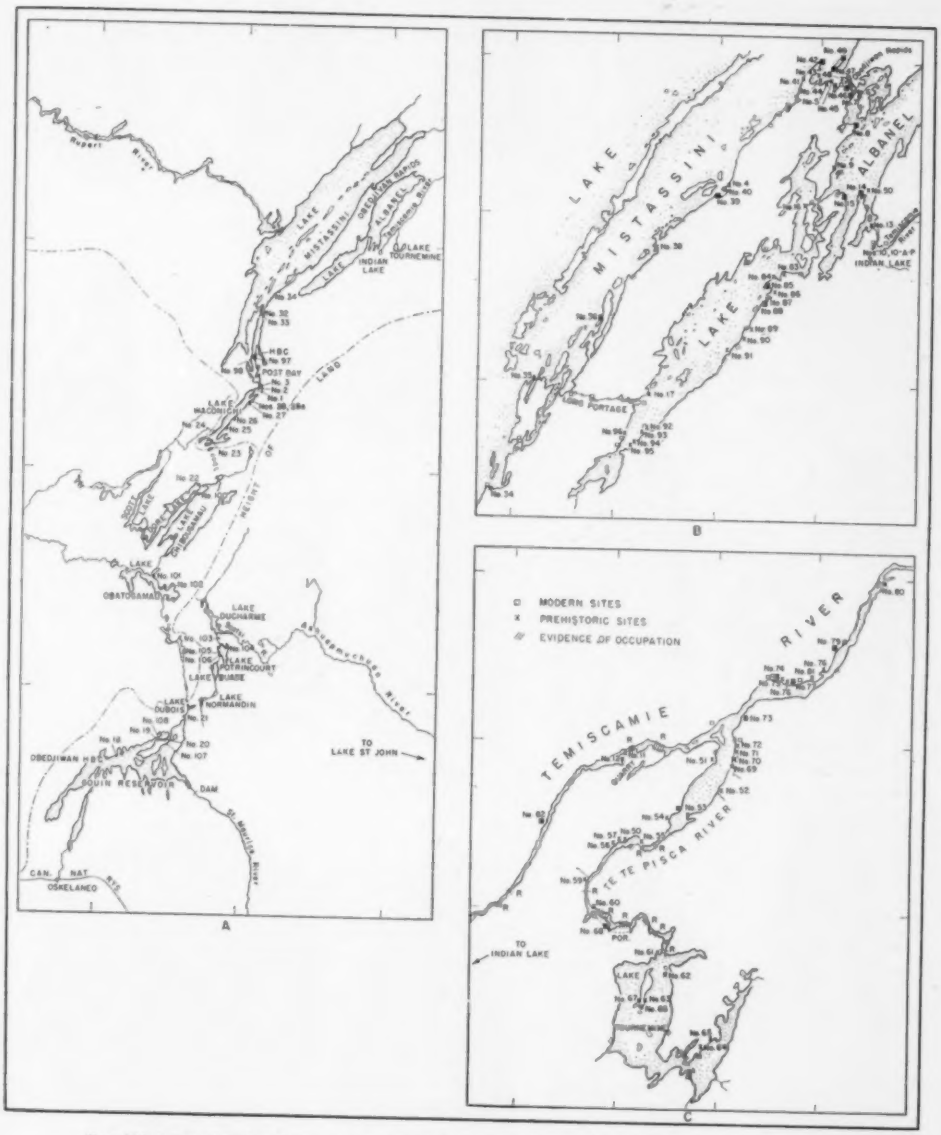

FIG. 103. Maps showing the locations of sites in the Lake Mistassini region, Province of Quebec.

TABLE 46. DISTRIBUTION OF ARTIFACTS ON SITES IN THE LAKE MISTASSINI REGION, PROVINCE OF QUEBEC

	Gouin Reservation	*Potrincourt*	*Dore Lake*	*Waconichi Lake*	*Post Bay*	*Mistassini*	*Site 6*	*Site 7*	*Albanel*	*Indian Lake*	*Site 10-G*	*Site 10-M*	*Site 12*	*Temiscamie River*	*Site 70*	*Site 78*	*Te Te Pisca River*	*Totals*
Pointed core implements																		
With striking platform									1	2			2	1	1	5	1	13
Finished						1			5	3		1	4	1	1	6		22
With broken butts				1					1		1	1	1	1		3		9
Fragments						6	1		10	5		22	7	10	2	60		123
Plano-convex implements																		
Pointed																4		4
Not pointed												1	2	1		8		12
Fragments						4			1	4		2	6	1		24		42
"Anvil-chipped"									4		1		3	2	1	3		14
Miscellaneous core implements	1									1		2	4	1		10		19
Disc-shaped core implements													2					2
Flake implements																		
Concave edge						2				1			2	2	1	3		11
Convex edge						3			1	2			1		2	3		12
Notched									1			2		2		1		6
Scrapers																		
Side					2	1				1		2	2	1		4		13
End	2				13	5			6	7	1	7	7	8	4	10		70
Long narrow End									1	1			1	3		6		12
Perforators					1				3		1							5
Blades																		
Type I						6			1				3	3		19		32
Type II	1				1	1	1			1		3	2	2		7		19
Type III						2			2	3		4	5	4		18		38
Type IV	1											1	2			1		5
Base shape 1						1			2	3	1	1	7	1		4		20
Base shape 2				1	1	3			3	1	2	2	1	2		2		18
Base shape 3					1				1			1	2		1	3	2	11
Base shape 4									2	1		1	3	1	1	4		13
Points symmetrical					5	4			4	2	1	13	5	7	1	13		55
Points asymmetrical						2				3		4	5	2		10		26
Fragments	1	1			4	8	1	1	10	9	3	18	12	5	4	25		102
Arrowpoints																		
Wide bladed													1					1
Triangular stemmed									1	1		1	1					4
Lanceolate stemmed												1						1
Lanceolate side-notched	1		1			1	1		1			1	1	1		1		9
Lanceolate convex base						3			1	1		4						9
Flake						1			1				1					3
Hammerstones	8					1		1		4			1					15
Gouge																	1	1
Axes													2					2
Gorget (?)																1		1
Battered and chipped (rocks not quartzite)	3											3	2					8
Adze																1		1
Beads							1	1										2
Totals	18	1	1	2	28	55	5	3	63	56	11	98	100	62	19	259	4	785

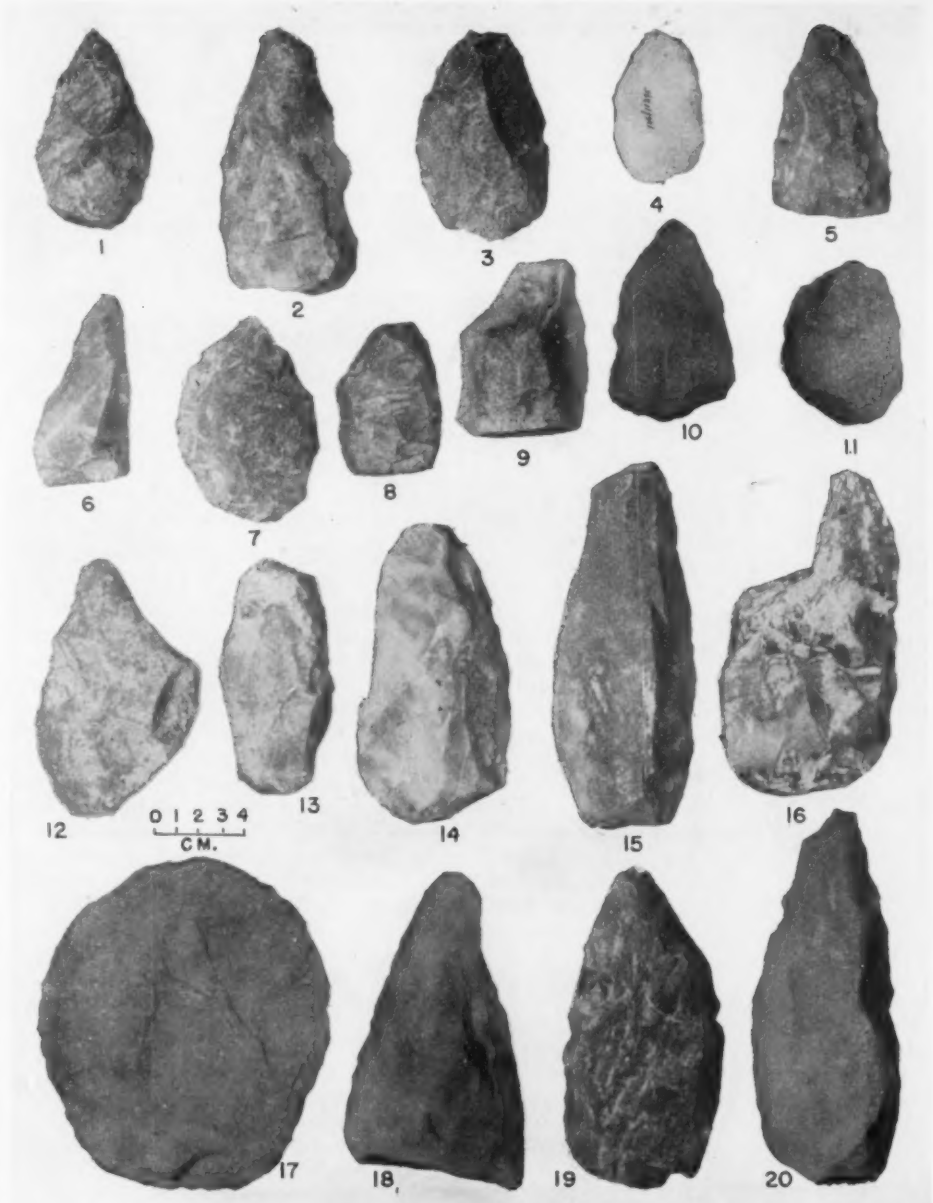

FIG. 104. Core implements from the Lake Mistassini region, Province of Quebec. *1, 5, 12, 18, 19, 20*, pointed implements. *2, 3, 6, 14*, plano-convex implements. *4, 8–10, 15*, plano-convex implements, "anvil chipped." *7, 11, 13, 16*, miscellaneous implements. *17*, disk-shaped implement.

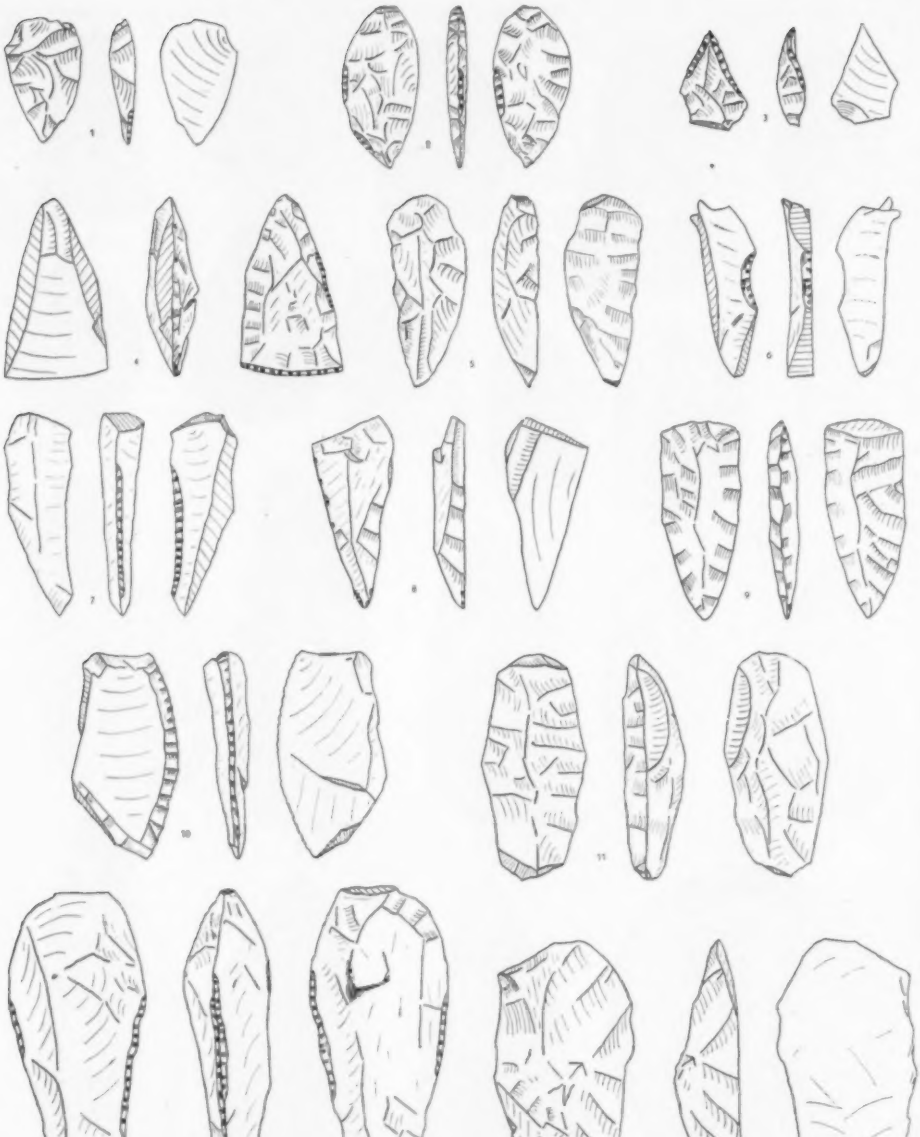

FIG. 105. Blade, flake, and core implements from the Lake Mistassini region, Province of Quebec. *1*, Type IV blade. *2*, Type II blade, *3*, perforator. *4*, *12*, pointed core implements. *5*, Type III blade. *6*, notched flake implement. *7*, flake implement with concave edges. *8*, *13*, plano-convex implements. *9*, Type I blade. *10*, flake implement with convex edges. *11*, core implement, rectanguloid.

cluded among these are Lakes Marmette and Omina, whose water level was lowered approximately 7 feet by drought. A flint chip and several possible quartz chips were found near the high water mark of a greatly eroded sandy beach, Site 18, on Lake Marmette. On the western side of Lake Omina are Sites 19, 20, 107, and 108, located on beaches of coarse gravel and sand 75 to 200 feet long and 15 to 25 feet wide. Hammerstones were found 15 to 20 feet back from the water on the beach at Site 20 and lighter weight artifacts 6 to 8 feet back. A few small chips were found in the water.

Other tools from sites along the shores of the Gouin Reservoir include two end scrapers made from quartzite flakes with a "vertical" retouch on one end. Also found were one blade of Type II, one blade of Type IV, one blade fragment, a fragmentary side-notched arrowpoint, eight quartz pebble hammerstones, three battered pieces of shale or similar rock, and one rectanguloid core made from a fine-grained stone.

IMPLEMENTS FROM THE MISTASSINI-ALBANEL REGION

In 1947 we collected several hundred implements from more than 30 sites. The observations made during the process of collection, and a description and discussion of the artifacts have already been presented.[2] The present account supplements the previous one. In several instances it has been possible to enlarge upon or to modify the first account largely because a combination of the two collections has resulted in larger series of various kinds of tools. In the interest of saving space few of the data previously published have been repeated. A full list of artifacts collected in 1948 appears in Table 46. Site numbers used are in the same series, so that a comparison of this table with that already published will permit determination of the full inventory.

POINTED CORE IMPLEMENTS

About one-third of these tools which are complete or nearly so have a convex base (Figs. 104, *19*, *20;* 105, *12*), another third are straight based (Fig. 104, *5*), and the remainder are irregular (Fig. 104, *12*). Evidence of a striking platform remains on about one-third of the implements (Fig. 104, *20;* 105, *12*). Retouching, purposefully or through use, appears on sections of the edges of a few specimens. The broad end of the implement shown in Figure 104, *5* is an example. These tools range in size from 7 cm. long, 4.5 cm. wide, and 1.5 cm. thick to 16 cm. long, 6 cm. wide, and 4 cm. thick.

PLANO-CONVEX IMPLEMENTS

The tools in this group are cores which have had one nearly flat face. Previously these were termed core scrapers and were described as being short and broad with one point. In the present collection they tend to be long and narrow, and the point, if it exists, is rather poorly developed (Figs. 104, *2*, *3*, *6*, *14;* 105, *8*, *13*). The smallest is 9 cm. long, 5 cm. wide, and 2 cm. thick; the largest is 13 cm. long, 6.5 cm. wide, and 3 cm. thick.

PLANO-CONVEX IMPLEMENTS, "ANVIL CHIPPED"

These were made from flakes of many shapes and sizes (Fig. 104, *4*, *9*, *15*). The edges were sharpened by the removal of chips, which were short, rather wide, and of medium thickness with well developed hinge fractures lying parallel to the edge and at a varying distance from it. This type of retouching was produced experimentally by striking the edge of a large flake against a stationary stone anvil. This is reminiscent of the technique described by Ellis.[3] Nevertheless, an edge of this sort could have resulted merely from use.

MISCELLANEOUS CORE IMPLEMENTS

These were described last year as disc and rectanguloid core implements. The sizes range from 7.5 cm. long, 5 cm. wide, and 2.5 cm. thick to 14 cm. long, 7.5 cm. wide, and 3 cm. thick (Figs. 104, *7*, *11*, *13*, *16;* 105, *11*). All but five are made from quartzite.

DISC-SHAPED CORE IMPLEMENTS

Two tools, percussion chipped on both faces and better made than the above, have been placed in this category (Fig. 104, *17*). One of those illustrated in the 1948 description should be included in this group.[4] The one unbroken specimen is 14 cm. long, 13 cm. wide, and 1.5 to 2 cm. thick.

FLAKE IMPLEMENTS

There are in the 1948 collection a number of flakes which were either retouched intentionally

[2] Rogers and Rogers, 1948; Johnson, 1949, pp. 91–8.

[3] Ellis, 1940, p. 18.

[4] Johnson, 1948, Pl. XI, *22*.

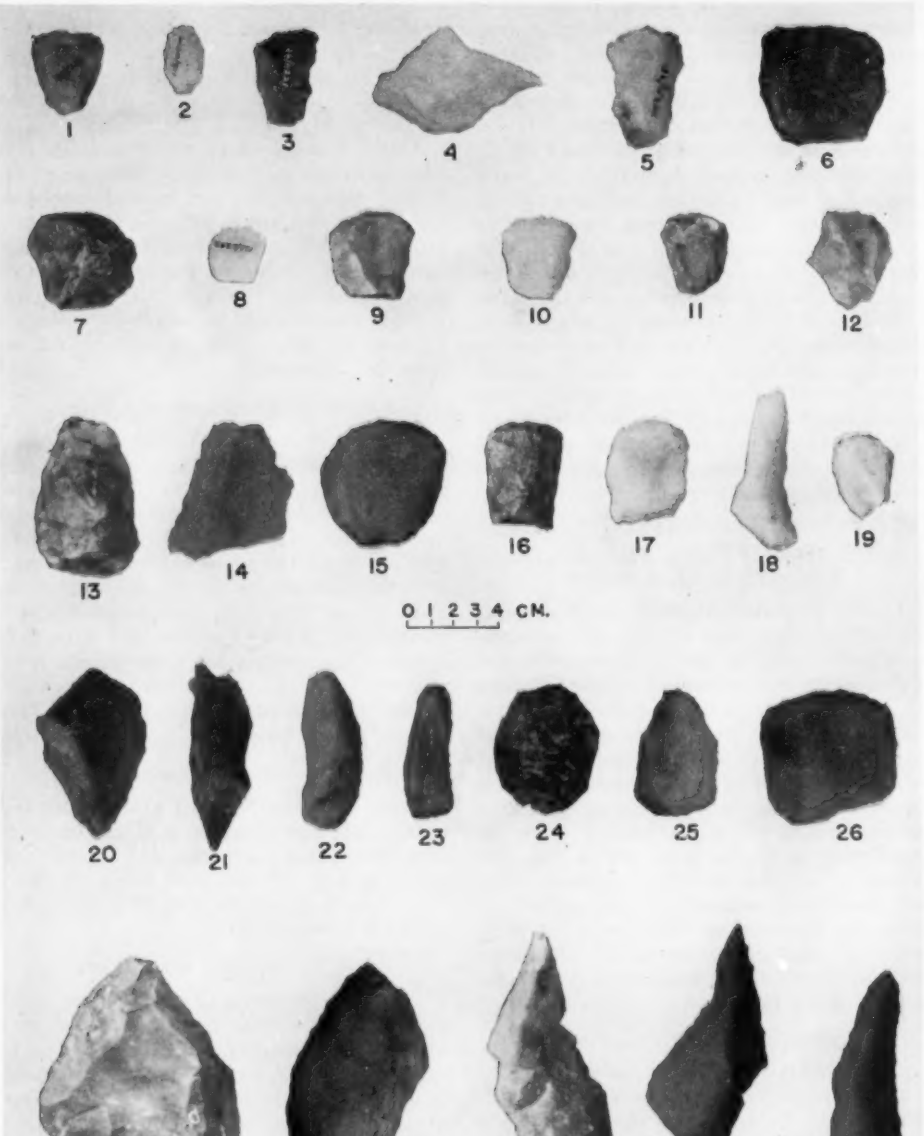

FIG. 106. Flake implements, side scrapers, and end scrapers from the Lake Mistassini region, Province of Quebec. *1–3, 5–13, 15–17, 25, 26,* end scrapers. *4, 18, 29, 21,* flake implements, concave edges. *14, 21,* flake implements, notched edges. *19, 22–24,* side scrapers. *20, 27, 28, 30,* flake implements, convex edges.

or through use. Experimentation revealed that in scraping a piece of wood a flake properly controlled developed on one face an evenly chipped edge having a bevel of about 45 degrees. If not controlled the chipping was erratic. In both cases the wood was scraped satisfactorily. Flakes, possibly retouched in some such manner, are here termed utilized.

It is not practical to classify these flakes into detailed categories because they vary greatly in shape and size. Tentatively, three groups have been designated: (1) concave edges (Figs. 106, *4*, *18*, *29*, *31;* 105, *7*), chipped by crude percussion on one face of rather long, narrow, and thick flakes; (2) convex edges (Figs. 106, *20*, *27*, *28*, *30;* 105, *10*), retouched by light percussion or utilized on one face of flakes of any shape; (3) notched (Figs. 106, *14*, *21;* 105, *6*), 0.5 to 2.5 cm. wide at the mouth, chipped by percussion on the edge of a flake.

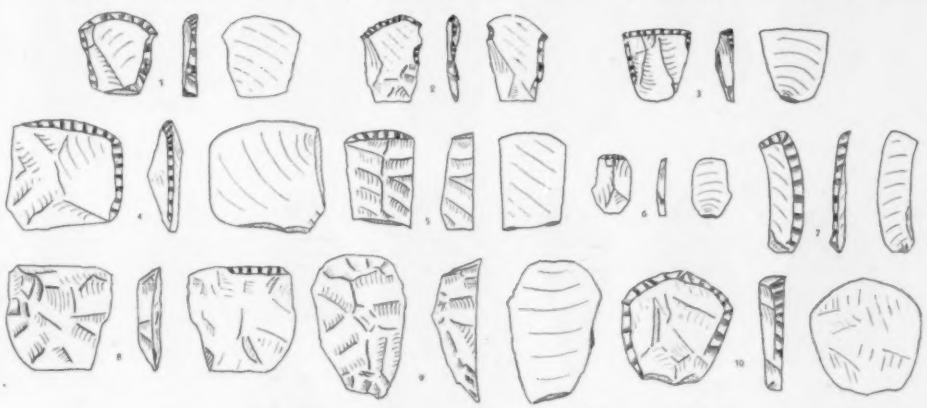

FIG. 107. Scrapers from the Lake Mistassini region, Province of Quebec. *1–4*, *6*, *8*, *10*, end scrapers. *5*, long, narrow end scraper. *7*, *9*, side scrapers.

SCRAPERS

Side scrapers are illustrated in Figures 106, *13*, *19*, *22*, *24* and 107, *9*. End scrapers range in size from small, thin chips 2.5 cm. long and 1.5 cm. wide to large flakes 5.5 cm. long, 5.5 cm. wide, and 1.25 cm. thick (Figs. 106, *1–3*, *7-12*, *17*, *26;* 107, *1*, *2*, *6*). A few have been made into definite shapes: oval (Figs. 106, *15;* 107, *10*), square (Figs. 106, *26;* 107, *4*), and trapezoidal or triangular (Figs. 106, *1*, *11;* 107, *3*). At one end a "vertical" retouch has been applied and in some cases has been continued around the flake. On a few—and this appears to hold true for those scrapers with a trapezoidal or closely allied shape—the chipping ends about one-half of the way down one side and less than a third of the way down the other. There are some scrapers on which chipping of the sides has been done from the face opposite that on which the "vertical" retouch has been applied. On some of the latter two forms points have been produced at the corners of the "vertical" retouched end. These points are poorly developed, but there is the possibility that they were used as gravers. One trapezoidal-shaped end scraper is unusual because only the concave face has been retouched on one edge (Figs. 106, *6;* 107, *8*).

Another group of end scrapers, made from rather long, thick, and narrow flakes, are distinct from those described above (Figs. 106, *5*, *16*, *25;* 107, *5*). A moderately steep percussion retouch has dressed the end to a convex edge. Occasional retouching at the sides of one face has formed a median ridge, but the opposite face is flat and without retouching. This gives the scraper a triangular transverse cross section. The smallest size is 3.5 cm. long, 3 cm. wide, and 1 cm. thick; the largest is 5.5 cm. long, 3.5 cm. wide, and 1 cm. thick.

PERFORATORS

These are made from fairly thick, triangular flakes having a sharp point formed by two of the edges. Retouching, probably by percussion,

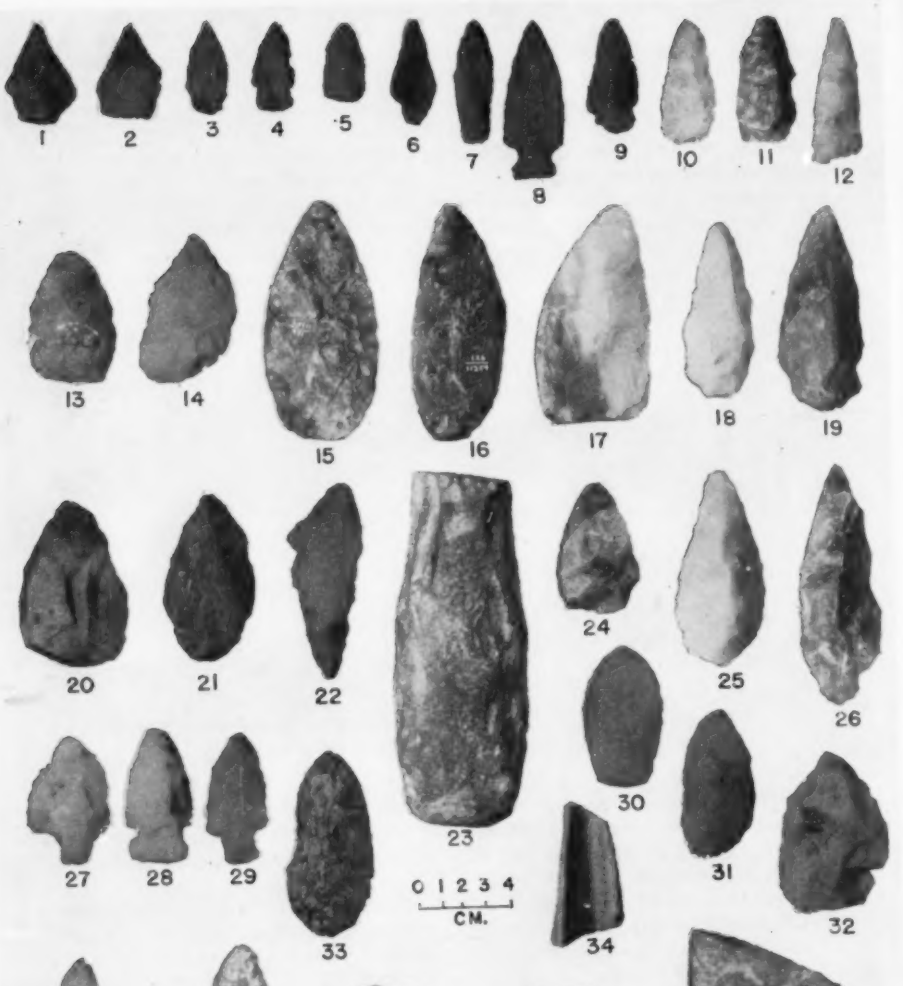

FIG. 108. Perforators, blades, arrowpoints, gouge, gorget, and adze from the Lake Mistassini region, Province of Quebec. *1, 2*, perforators. *3, 4, 8, 12, 28*, lanceolate, side-notched arrowpoints. *5, 10*, lanceolate, convex-base arrowpoints. *6, 8, 9*, side-notched arrowpoints. *7*, lanceolate arrowpoint. *11, 19, 22, 25, 26, 33*, Type III blade. *13, 14, 17, 21, 32*, Type II blade. *15, 16, 18, 31, 35, 36*, Type I blade. *20, 24*, Type IV blade. *23, 38, 39*, adzes. *27, 29*, trianguloid, stemmed arrowpoint. *30*, wide-bladed arrowpoint. *34*, gouge, *37*, gorget.

extends along the edges of the point on only the outer face of the flake, and back from the edges about 3 mm. (Figs. 108, *1, 2;* 105, *3*). The best specimen measures 4.5 cm. long, 3 cm. wide, and 1 cm. thick.

BLADES

The classification of specimens found differs slightly from that published in 1948.

Type I: long, narrow blades with one point (Figs. 108, *15, 16, 18, 31, 35, 36;* 105, *9*). These range in size from 6.5 cm. long, 3.5 cm. wide, and 1.5 cm. thick to 11.5 cm long, 4 cm. wide, and 1.5 cm. thick.

Type II: short, broad blades with one point (Figs. 108, *13, 14, 17, 21, 32;* 105, *2*). The size of the largest blade is 11 cm. long, 6 cm. wide, and 1.5 cm. thick and the smallest 5 cm. long, 3.5 cm. wide, and 1 cm. thick.

Type III: long narrow blades with one point, plano-convex in cross section (Figs. 108, *11, 19, 22, 25, 26, 33;* 105, *5*). In 1947 these blades were described as retouched on one face only. This year approximately four-fifths are retouched on both faces. One face was dressed nearly flat, apparently intentionally. Six of the blades are asymmetrical and five show the remains of a striking platform. They range in size from 5.5 cm. long, 2.5 cm. wide, and 1 cm. thick to 10.5 cm. long, 3.5 cm. wide, and 1.5 cm. thick.

Type IV: short, broad blades with one point, plano-convex in cross section (Figs. 108, *20, 24;* 105, *1*). In this group are four blades made from flakes retouched on the outer face only. The inner face is rather flat or concave in each case. The sizes range from 6 cm. long, 3.5 cm. wide, and 1 cm. thick to 7 cm. long, 5 cm. wide, and 1.5 cm. thick.

These blades have bases which can be divided into four main shapes: (1) blades with expanding sides ending in a convex base, (2) blades with contracting sides ending in a convex base, (3) blades with contracting sides ending in a straight base, and (4) blades with parallel sides ending in a straight base. About two-thirds of the blades may be classed in (1) and (2), but no one shape is confined to a single blade type.

About one-fourth of the blades are asymmetrical (Fig. 108, *21, 24*). This is not characteristic of any one blade type, but does tend to be found more often in Types II and III.

ARROWPOINTS

Twenty-six small blades, called arrowpoints, could have been used for several purposes. Five more or less distinct types are represented on the basis of shape.

The wide bladed arrowpoint shown in Figure 108, *30* has its greatest width one-third of the distance from the point. It is straight based, 6.25 cm. long, 3.5 cm. wide, and quite thin. All the other arrowpoints have the greatest width not more than one-third of the distance from the base.

Four trianguloid stemmed arrowpoints (Fig. 108, *27, 29*) range in size from 4 cm. long and 2 cm. wide to 6 cm. long and 3.5 cm. wide. Two are asymmetrical. One long and narrow lanceolate arrowpoint is stemmed (Fig. 108, *7*).

There are eight lanceolate side-notched arrowpoints (Fig. 108, *4, 8, 12, 28*) ranging in size from 4 cm. long and 2 cm. wide to 7 cm. long and 2.5 cm. wide. The bases are straight except for one specimen (Fig. 108, *12*), which has a slightly concave base and small side-notches 2 mm. wide and the same deep. One point is made from a flake only the edges of which have been retouched.

Nine arrowpoints are lanceolate with convex bases (Fig. 108, *5, 10*). On four of these, the original surface of the flake constitutes one face (Fig. 108, *5*); that is, it is not retouched. The sizes range from 3.5 cm. long and nearly 2 cm. wide to 6 cm. long and 2.5 cm. wide.

Three other arrowpoints (Fig. 108, *6, 9*) were made from suitable flakes, the retouching extending back on both faces for about 2 mm. from the edge and concentrated near the point. Side-notches have been crudely chipped on one (Fig. 108, *9*).

HAMMERSTONES

On a good many sites hammerstones were seen, but because of their weight only seven were brought back. Three, roughly spherical in shape, were apparently made from cores. Crude flaking appears on sections not battered. Two, somewhat triangular in outline, have been battered on the wide end. Another is rectanguloid and has been battered on its sides. There is one flake of quartzite, battered on two sides, which to some extent resembles one illustrated in 1948.[5]

POLISHED STONE ARTIFACTS

This year several pieces of polished stone were found. One of these is a section of the poll of a gouge (Fig. 108, *34*) made from a fine grained red stone. The groove probably extended the entire length of the tool. A polished piece of red slate (Fig. 108, *37*), 3 to 4 mm. thick, may be a fragment of gorget, but its

[5] Johnson, 1948, Pl. IX, 19.

fragmentary nature prevents identification. Along one section of the only remaining polished edge and extending back from it at right angles are a series of incised lines 2 to 3 mm. long spaced 2 mm. apart.

ADZES AND CELTS

There is one adze (Fig. 108, *23*) chipped from a block of shale (?). Its cutting edge is chipped and polished, probably by use. The fragmentary specimens shown in Figure 108, *38*, *39* have been pecked from a medium grained rock. *38* appears to be the poll of a crude ax or adze; *39* is partly polished and may have been the blade of a celt. What could be considered the cutting edge has been blunted to a flat surface possibly by polishing and/or pounding. It has been called a celt more or less by courtesy, for it could not have been used as a cutting tool in its present form.

EXCAVATIONS

In 1947 we discovered a large area on the Temiscamie River which included an outcrop of rock from which the Indians had quarried material for their artifacts. This we named "the Quarry Site"; it was located on a ridge east of the river. Surrounding this quarry were areas of occupation which we called Sites 11 and 12 and the Hilltop Workshop. On the advice of Mr. Johnson we returned to this area in order to excavate sections in the hope that further data would be forthcoming.

After digging a number of test pits we located trenches on Site 12. As previously described this site is located below the quarry itself on a small bay partially cut off from the river by a point to the northwest. The excavations were made at the northwest corner of the bay where the bank is 2 to 4 feet high and the land, for a few hundred yards, rises gently and then grades down to the river on the opposite side.

Trench 1, 8 feet from the water, and Trenches 2 and 3, located to the north of 1 and 20 feet from the water, were from 80 to 121 inches long and 40 inches wide. Excavation was carried through occupied levels into the sterile underlying yellow sand at a depth varying from 17 to 33 inches.

The cross section in Trenches 2 and 3 was characteristic of the country (Fig. 109). The uppermost layer was duff, 5 to 8 inches thick, composed of roots and rotted vegetable material. At the bottom of this layer, in Trench 2, was a concentration of well preserved charcoal, pieces of which were found in the underlying white sandy-clay. In Trench 3 the charcoal

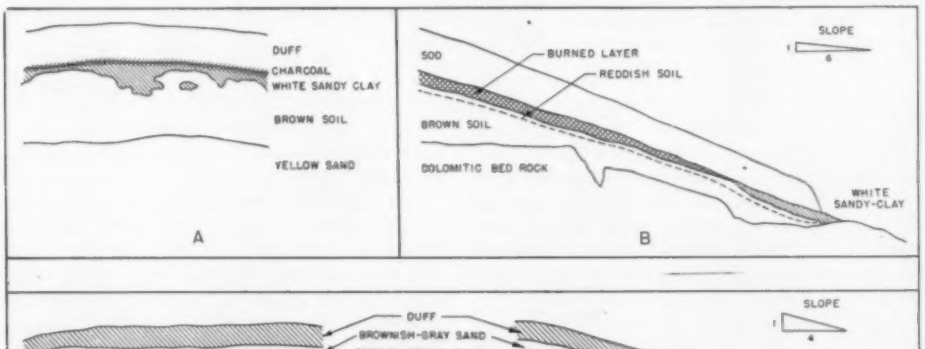

FIG. 109. Cross sections of sites in the Lake Mistassini region, Province of Quebec. *A*, Site 12, Trench 3. *B*, Site 6. *C*, Site 10-M, transverse section. *D*, Site 10-M, longitudinal section.

was scattered throughout the white sandy-clay, the lower part of the duff, and the top of the underlying brown soil. The white sandy-clay, 2 inches thick, was very fine grained and somewhat gritty. The layer was quite compact, perhaps because it was damp while being excavated. Beneath this layer the brown soil had extremely irregular surface. This soil was fine grained but not as compact as the overlying layer. The upper 2 to 4 inches were dark in color, grading into yellow sand which became coarse at the bottom of the trench.

Twenty-eight specimens were excavated from Trenches 2 and 3. None were found in the duff. A battered piece of stone, a fragment of a blade, and a chip, probably utilized, lay on the top of the white sandy-clay. Twelve specimens were found in the white sandy-clay. They are classified as a blade of Type I (Fig. 108, *35*), a blade of Type IV, an "anvil chipped" plano-convex implement, scraper, core implement, pebble, broken blade, and several flakes. A pointed core implement, fragments of blades, utilized flakes, in all eight implements, were found on the surface of the brown soil. Five specimens were beneath this surface at a maximum depth of about 3 inches. They are probably to be identified with those obtained from the surface of this layer.

In Trench 1, under 4 to 5 inches of duff, was a layer of charcoal, some of which appeared in lumps, the rest being finely ground. Although no white sandy-clay was identified below this layer it is still possible that it was present either as a thin discontinuous layer or as material stained by the fires and charcoal. Beneath the charcoal was 5 to 8 inches of brown soil, which graded imperceptibly into the underlying yellow sand.

Fourteen of the eighteen specimens recovered from this trench were found in the burned layer. These included one wide-bladed arrowpoint (Fig. 108, *30*), one blade each of Types I (Fig. 108, *31*), II (Fig. 108, *32*), and III (Fig. 108, *33*), a pointed core implement, four fragments of blades, two end scrapers, and several flakes. Two fragments of blades and one fragment of a core were found in the brown soil not more than 2 inches below its surface.

The account given above of the stratification of the soil at Site 12 raises several questions regarding the way in which these strata were formed, the answers to which, at the present writing, can only be surmised. The charcoal is most likely the result of forest fires and not in every case the remains of hearths, while the yellow sand and brown dirt may be actually a single deposit, the colors being due to the weathering of glacial debris. The white sandy-clay may also be the result of weathering; the A-horizon of a soil profile. On the other hand, its uniformly fine grained composition and the presence of charcoal scattered throughout leads one to suspect that possibly it is a wind-blown deposit. In no case do any of the strata appear to be disturbed, except possibly by frost action.

In 1947, seventeen sites were located on Indian Lake.[6] This unusual concentration suggested some interesting problems, and it was hoped that excavation might reveal useful information. Test pits were dug at a number of these sites, but very little material was found *in situ* at a distance from the water. Most of it was scattered on the beaches between the slumping bank and a point 1 to 3 feet out into the water. Undoubtedly the sites had been greatly eroded by wave and ice action. However, conditions at Sites B, G, and M seemed to warrant excavating. Trenches 40 to 60 inches wide were started at the edge of the bank and extended back 70 to 118 inches. They were dug through the culture-bearing strata to a depth of 10 to 25 inches.

At Site B the duff was 3 inches thick. Its lower part, made up principally of roots, was embedded in a dark soil. This rested upon about 4 inches of white sandy-clay. The surface of this layer was very uneven and in places contained pockets several inches wide and deep, filled with the dark soil. We are unable to state with certainty the reason for this phenomenon, but suggest the possibility of frost action. Below the white sandy-clay a 3-inch layer of brown soil was underlain by yellow sand. No artifacts were found. Chips were located in the lower part of the dark soil and on the surface of the white sandy-clay.

Site G had the usual layer of duff 3 to 4 inches thick but lacked the white sandy-clay typical elsewhere. Under the duff was found a layer of brown soil 2 to 6 inches deep, with burned stones and pieces of charcoal scattered throughout. The brown soil in turn rested upon yellow sand which, towards the bottom of the excavation, contained a large number of stones. To the rear of the trench, away from the water, a thin layer

[6] Rogers and Rogers, 1948, pp. 87–9, Fig. 14.

of charcoal was situated between the brown soil and the yellow sand. The surface of the yellow sand was very uneven, similar to the surface of the white sandy-clay at B.

All of the fifteen specimens excavated at G came from the brown soil. These included one blade of Type I, a fragment of a core implement, five fragments of the blades, and chips, some of which were possibly utilized. Chips were most numerous in the lower part of the brown soil, with relatively large concentrations in the pockets of the sand. A few chips were found in the lower part of the duff.

Site M is an unusual site in that it is situated on a slope having a grade of about 25 per cent. This grade increases somewhat toward the top of a rise 40 feet high back of the site. It seems impossible that anyone could live on a spot having such a grade, but during the past two years over 100 artifacts have been collected, more than at any other site except 78.

A trench on this site (see cross sections, Fig. 109, *c*, *d*) revealed a layer of duff 2 to 4 inches thick, beneath which was a stratum of fine-grained brownish-grey sand. This layer was some 7 inches thick at the lower end of the trench, but about 25 inches uphill it rapidly thinned to a depth of 2 inches. This was not a homogeneous layer, as lenses of light brown sand, pockets of white sandy-clay, and a thin burned layer of charcoal were present at the front end nearest the water. At the rear of the trench and underneath the brownish-grey sand there was uncovered a layer of fine-grained, reddish-brown sand mottled with grey sand. This contained particles of charcoal. The layer was from 1 to 7 inches thick. Below this stratum was a thin, burned layer composed of finely broken charcoal mixed with the reddish sand. A layer of white sandy-clay about 1 inch in depth underlay this to rest in turn upon another burned layer. The down-hill end of these four strata ended at a boulder or near the middle of the trench where they come in contact with the brownish-grey sand. What appeared to be a hearth was located on one side and towards the rear of the trench. Here large quantities of charcoal, some in small pieces, the rest finely divided, and numerous burned stones were incorporated in the two burned layers, in the intervening white sandy-clay, and in the lower part of the reddish-brown and grey mixed sand.

Below these strata was a continuous layer of pink sandy-clay increasing in thickness from 1 inch at the front of the trench to 5 inches at the rear. This sandy-clay and the white sandy-clay were both fine grained, differing only in color. A few stones, scarce above this level, and pieces of charcoal were scattered throughout. Next to the stones on the uphill side the pink sandy-clay was a bit thicker than elsewhere and contained a relatively larger number of chips and artifacts. Under this stratum was a layer of white sandy-clay 2 to 3 inches thick, followed by brown soil which contained an increasing number of stones as greater depths were reached. At the front of the trench, separating the pink from the white sandy-clay, a 1-inch layer of brown sand extended uphill for about a foot.

A total of 115 specimens was found in this trench. The brownish-grey sand contained 42 specimens, all of which were located near the front half of the layer and 3 inches or more below its surface. Chips were found throughout the layer. The specimens included three battered pebbles, a stemmed lanceolate arrowpoint (Fig. 108, *7*), a lanceolate convex base arrowpoint, two side scrapers, ten blade fragments, six end scrapers, one notched flake, two flake implements with convex edges, a fragment of a core implement, and chips and utilized flakes. In the reddish-brown and grey mixed sand there were thirteen specimens comprising one lanceolate convex base arrowpoint, six blade fragments, one "anvil chipped" plano-convex implement, an end scraper, a fragment of a core implement, and three flakes and chips. The upper burned layer contained one blade fragment and one flake. Two blades, one end scraper, one flake, and one chip were found in the white sandy-clay situated between the two burned layers. The lower burned layer contained two blade fragments and one utilized flake. In the pink sandy-clay there were 49 specimens: one side-notched arrowpoint (Fig. 108, *8*), a stemmed arrowpoint, two blades of Type III, twenty blade fragments, six fragments of core implements, two end scrapers, one notched flake, and a flake implement with concave edge. The rest of the specimens were flakes, some of which showed signs of use.

To assume that the chips and artifacts are where the aborigines left them would mean that the occupation of this site commenced in the pink sandy-clay and continued uninterrupted into the layer of brownish-grey sand. This situation is not comparable to other cross sec-

tions in the vicinity. The steep slope on which the site is situated and the greater accumulation of artifacts and pink sandy-clay on the uphill side of the rocks suggest modification by slope wash. However, this could have taken place only during the beginning of occupation because the overlying hearth and burned layers are still in their original positions. Later—and this is only a tentative suggestion—the soil higher up the slope may have slid down the hill intact, due to congeliturbation,[7] so overriding the lower deposits.

At Site 7, near Obedjiwan Rapids, we excavated a trench located 23 feet from the shore and north of the 1947 trench. The duff was 6 inches thick, but the burned layer found previously was not present. A discontinuous layer of very fine grained, light brown soil from 1 to 3 inches thick underlay the duff. It was interrupted by extensions upward of the dolomitic bed rock. Under this layer, in large pockets in the bed rock, was a dark brown soil not more than 2 inches thick.

A few pieces of calcined bone were found on the surface of the light brown soil. One fragment of a blade and a glass bead were recovered from the dark brown soil. A few chips were found in the lower part of the duff, where it rested directly on the bed rock. Where there was sufficient depth of soil the chips were always well below the duff, extending down into the cracks in the bed rock.

The finding of one trade bead does not necessarily mean that this site is post-contact. The trench was situated at the center of a modern Indian's tent site and the thin mantle of soil may have been disturbed, causing the bead to become mingled with the chips.

Sections of Site 6, located on the eastern end of the portage about the Obedjiwan Rapids, between Mistassini and Albanel, had been excavated in 1947. This year a trench (Fig. 109, *b*) was dug in an area where the mantle of soil was not interrupted by outcroppings of the underlying ledge.

The top layer, 3 inches deep, was sod composed of grass roots, decaying vegetable material, and a little soil. Under this was a layer an inch thick of well preserved pieces of charcoal included in a mass of finely divided burned material. This rested on top of a reddish soil about 1 inch in thickness, which was fine grained and moderately compact. Under this was a layer of dark brown soil varying in depth from 1 to 4 inches and covering the uneven surface of the underlying bed rock. This soil was fine grained but not as compact as that above. The surface of each stratum followed the contour of the bed rock surface. At the front end of the trench, i.e., nearest the water, the burned layer gave way to a white sandy-clay. This was quite fine grained and somewhat compact.

In the upper part of the sod a few bones were entangled in the grass roots. A trade bead was recovered during the process of removing the upper 2 inches of sod. Its exact provenience is not known except that it was included in the superficial layer. Three artifacts were recovered from the dark brown soil. They were a blade of Type II and fragments of a blade and a core.

The distribution of the chips, which presumably locates the occupation of this site, is not readily explainable. The grade of the surface and its underlying strata, which lie parallel, is about 15 per cent. In view of the character of the underlying materials the position of the chips could not be greatly affected by slope wash and slumping. This seems particularly true when it is observed that the burned layer is continuous and uninterrupted. However, the chips in the uphill section are only found in the underlying brown soil. At the downhill end, above the section which may have been affected by wave action, chips were found in the sod, burned layer, and the brown soil. The tenuous inference from this small amount of available data is that the occupation of the uphill portion of the trench was terminated before the development of the burned layer. In the section near the shore occupation continued until the overlying sod layer began to develop. This occupation terminated some time ago as no chips were found on the surface of the sod.

SURVEYS

In the course of the surveys made to determine the geographical distribution of sites a number of test pits were dug. The stratigraphy of these was, with some exceptions, similar to that found in Trenches 2 and 3 at Site 12. Chips were found in the burned layer and the lower half of the duff at Site 58 on the Te Te Pisca River, on the surface of the white sandy-clay at Site 10, Indian Lake, and at Site 42 on Lake Mistassini. They were incorporated in the white sandy-clay at Sites 75 and 78 on Temiscamie River. Two test pits differed. At Site 98, Post

[7] Bryan, 1946.

Bay, a few chips and artifacts were found on the surface of a rather compact layer of fine grained, reddish soil which rested upon white sandy-clay. Covering these strata was an inch of grassy turf. Site F, Indian Lake, described last year, was again examined because of its extremely wet nature. Chips were found on the surface of a burned layer, which was covered by 5 to 6 inches of light brown soil. On top of this layer was 4 to 5 inches of very wet duff. Water was observed seeping out of the lower half of the light brown soil layer. We can add no further data to explain why this spot was ever chosen as a camp site.

DISCUSSION

The preceding descriptions provide some information concerning a stone industry which existed in a section of the Mistassini-Albanel watershed, which is some 100 miles long and about 30 miles wide. Inferences from the position of the artifacts in the regional cross section are that the industry has a respectable antiquity and that it continued in time practically to the present.

In many instances artifacts and chips were found on the surface of or actually in the layer of white sandy-clay. In special situations they were found below this layer. In other instances the artifacts were discovered in the brown soil which occupies the same stratigraphic position as the white sandy-clay. Excavations and other observations are reason for believing that the white sandy-clay is widely distributed horizontally and vertically, especially in the Temiscamie River Valley. The material is fine grained and well sorted and it seems to us possible that it may be a wind-blown deposit marking some geological event in the region. Another explanation may be that the deposit is the bleached zone of a forest soil profile. Although possible, this explanation appears to be less likely in view of the character of the layer's distribution. In either case, however, an appreciable length of time must be allowed for its development after the deposit of the artifacts. The notion that many of the sites may be rather ancient is supported, also, by the fact that nearly all the sites are greatly eroded and that many of the artifacts are water rolled.

The white sandy-clay is overlain by an extensive but discontinuous burned layer, which in some cases also includes artifacts. This layer is probably the result of forest fires, for only rarely is there a suggestion that the charcoal came from aboriginal hearths. This burned layer is covered by duff or sod which is still accumulating. The location of the artifacts in the bottom of this duff and the discovery of rare trade beads with them is reason for suggesting that the industry continued until comparatively recent times. This latter assumption is supported by Skinner, Hind, and Turner,[8] who note that the Indians had and in some cases were still using stone tools—although the latter two records are special cases.

Technologically and typologically the industry is characteristic of primary stages recognized in other areas, in that the tools are simple and the varieties few. Furthermore, percussion techniques appear to have been used except in some instances where crude pressure flaking may have been employed. A discussion of the distribution of the artifacts in this collection is restricted by the lack of comparative material and by the meagre knowledge regarding human migrations and cultural diffusion in the North during post-glacial and recent times. It is not possible to add to the comparisons which have been recorded.[9] However, a great many of the tools discovered are similar to types developed during the Lower and Middle Paleolithic of Europe. We have found no record of similar tools from northeastern Siberia[10] or from Alaska. At the moment the distribution of such tools in the world, to say nothing of North America, is discontinuous and not readily explainable. It is puzzling to note that all early American cultures, with the exception of Site GL-1 and Killarney[11] where apparently a primitive stone industry existed, exhibit more advanced types and technical abilities.

It is not, in our opinion, logical to assume that this industry is a degenerate form of some more advanced industry the source of which may be identified in another region. Until our knowledge of the ecology of the region is more complete we can only assume that the taiga invaded the tundra which covered the region at the close of the Pleistocene. The people who moved into the region are assumed to have been taiga hunters, the theoretical and as yet

[8] Skinner, 1911, p. 52; Hind, 1863, Vol. 1, p. 292; Turner, 1894, p. 302.

[9] Johnson, 1948.

[10] Davis, 1940, pp. 1–58.

[11] Greenman, 1942, pp. 260–5; Greenman and Stanley, 1940, pp. 305–13; 1943, pp. 505–30.

unproved origin of which has usually been located to the west. As yet no clear typological similarities among various groups of cultural materials in the north can be seen. The stone industry of Dorset, Old Bering Sea, and other Eskimo cultures distributed along the Arctic coast differ considerably from that found at Mistassini. Similarly, inventories of tools in culture complexes located in northeastern United States are not comparable, except for sporadic instances where rare tools may be somewhat similar. Our data are an indication of the possibility that the earliest of the Mistassini sites may have a respectable antiquity and that the latest may be of quite recent date. Furthermore, during this period there existed a stone industry, the characteristics of which are usually thought to be primitive. We have not found reference to the existence of a similar industry producing a comparable inventory in North America.

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Lincoln, Vermont
Methuen, Massachusetts
July, 1949

FACTS AND COMMENTS

ECOLOGIC ADAPTATION AND CULTURAL CHANGE IN ARCHAEOLOGY

The new age-dating method based on the radioactive carbon isotope C^{14} is now turning out absolute dates and promises to reorganize the chronological framework of American archaeology. The results demonstrate that conventional methods of determining relative and absolute age are often uncertain, and that a much more exact technique can in most cases be substituted for the type seriation of archaeology.

Of course the new technique still has its shortcomings, but that does not basically affect the argument. C^{14} age-dating represents the first clear step towards making archaeology an exact science. As a result, a reorientation of the central emphasis in archaeology must sooner or later take place.

Actually, this situation makes it possible for the archaeologist to go one step further in his interpretation than has generally been the case till now. The temporal framework will soon be established with reasonable security, and when a fertile approach to the subject matter is adopted, generalizations of value to all in anthropology should be forthcoming. The following attempts to sketch a framework for North American archaeology in terms of cultural adaptation to ecology.

The paleontologist studies structural adaptations of groups through time to changing ecologic niches and is able to make a synthetic picture of organic evolution. Similarly, in archaeology one has a continuous record of cultural change. By regarding this change as a process of adaptation to a specific ecologic niche, the patterns of change should make as much sense to the archaeologist as do structural changes to the paleontologist. We live in a civilization in which man is directly or indirectly exploiting a large part of the total ecology, and this strongly influences our thinking. But it is logically equally possible for a group of people to exploit only a small part of the total available food source, as clam diggers or deer hunters, who may be as limited and specialized in their food habits as are most mammalian species. Contemporary examples are the ecologically very highly specialized reindeer-herders and hunters of the circumpolar area, the Eskimo sea-mammal hunters, etc. Such specialization in ecologic niche enables separate groups to co-habit the same natural and cultural area without entering into direct competition, as for example, the Pueblo and the Navajo. Thus cultural change may be described in terms of the ecologic adaptation towards which it is moving since this is a major controlling factor of the change.

North American archaeology furnishes a record of continuous adaptation of peoples to a great number of different ecologic niches, and if seen in this framework, the cultural history of the area can be fitted into a pattern, and inferences can be made on a much more specific basis. Some examples, especially relevant to the eastern United States, might best illustrate the approach.

1. Assuming North America to have been populated over the Bering Sea some time before 10,000 B.C., certain cultural characteristics of the early invaders can be postulated, in agreement with the archaeological evidence:

The only contemporary successful adaptation to tundra habitat is that of the reindeer hunters, and we see archaeologically that these were also the first to follow the receding glaciers of the last Ice Age in Europe. Thus hunters of large herd animals, coming from a loess-plain and tundra habitat would be the first to reach the Bering Sea. They specialized in the ecologic niche of hunting large herds of mammals on open, treeless plains, and with little or no new adaptations they could spread into areas of North America where this specialization transferred to buffalo, was serviceable, expanding through the Plains as far south as Folsom, New Mexico.

The main barrier was between the Plains and the wooded eastern areas. Techniques and adjustments of plains type are of little use in the eastern area; the flora is different, and deer cannot be attacked by methods devised for buffalo hunting. Thus the ecologic boundary was not crossed, and population pressure consequently began building up in the Plains.

2. The simplest adaptation to any new ecologic area is that of clam-collecting—no special skills have to be developed, and although not providing a great surplus, clam-eating furnishes ample subsistence for small groups. In northern Europe in post-glacial times the coniferous forest belt was first entered and inhabited by clam-eaters with their characteristic kitchen middens. The first Archaic manifestations in the southeastern United States are similarly shell middens. Thus at some time, population pressure forced groups of people from the Plains to cross the ecologic threshold and enter the eastern wooded area, and this required a major shift in adaptation from specialized hunter to impoverished clam-eater. The sporadic finds of Folsomoid materials in the eastern United States may stem from this period of transition.

The Archaic, according to W. H. Sears (unpublished M. A. thesis), is characterized by a lack of cultural divisions and aspects—any one site is similar to the sites in the proximity, and cultural differences between two manifestations are proportional to the actual distance between them. Assuming the Archaic to be a new adaptation to an ecology to which few former specializations were transferable, this is what one would expect. New adaptations would spread equally to all groups in the ecologic area, and geographic separation would be the only generator of differences. Thus the first adaptation to the Eastern Woodland area was based on a shellfish subsistence.

3. The transition to a Woodland adaptation involved no major breaks. Once inside the area, hunting of small and large game in the woodlands could be learned progressively and the techniques elaborated, concomitant with a decrease in emphasis on shellfish for subsistence. The introduction of pottery and some agriculture, although representing major economic advances, need not involve any change in population. Within the Eastern area, the Woodland pattern could thus gradually grow out of an Archaic pattern, surely at different rates and times at different places. A synthesis

of the Woodland way of life within the area resulted in a cultural florescence. Carbon dates suggest that this florescence came at an earlier time than we have been used to thinking.

4. Again with no necessary cultural discontinuity, population growth produced concentrated areas of habitation, and hunting had to form a decreasing part of the subsistence, whereas farming became by necessity more intensive. Thus the Mississippi Pattern was developed, representing an alternative adaptation to the Eastern Woodland and Mississippi Valley ecologic area: dependence on agriculture. Once developed, the Mississippi Pattern could exist in the same area as the Woodland (e.g., in Illinois) without serious competition resulting; farming and semi-nomadic hunting with sporadic agriculture are different niches in ecology, exploiting different sources of food.[1] Between such separate groups symbiotic relationships of trade and limited cooperation were probably established, as suggested by certain trade goods. Serious conflict on a large scale between sedentary and hunting groups only resulted when white expansion led to displacement of whole populations, overtaxation of faunas, and over-limitation of available area for the hunting tribes.

An attempt along the above rough lines at approaching the problem of cultural development from a somewhat different angle would seem to be more fertile in view of the new developments in archaeology. It can no longer be the archaeologist's ultimate ambition to make chronological charts of cultures; that can soon be done through cooperation between a chemist and a bulldozer. The only way the archaeologist can contribute to the general field of anthropology is by asking questions of *why*, for which a general framework is needed. One simple and directly applicable approach is that of ecologic analysis of cultural adaptations, treating problems of relationship of the ecologic area, the structure of the human group, and its cultural characteristics.

FREDRIK BARTH
Chicago, Illinois
October, 1949

[1] Some groups, e.g., of Plains Indians, were active in two types of seasonally separate adaptation, farming and hunting. The distinction between the two patterns of life was recognized in seasonal differences in social structure, e.g., kinship systems.

TRIPOD VESSELS FROM THE VIRÚ VALLEY

In a recent paper[1] Arden R. King notes that the occurrence of tripod vessels in pre-Expansionist Central Andean periods has not yet been definitely established. The Columbia University Virú Valley collection, however, contains two examples of conical legs belonging to the type Castillo, White, Red, Orange. This pottery type has a Middle Gallinazo distribution.[2]

[1] Arden R. King, "Tripod Pottery in the Central Andean Area," AMERICAN ANTIQUITY, Vol. 14, No. 2, pp. 103–16, 1948.

[2] The full stratigraphic and other sequences secured by the Columbia University unit of the Virú Valley Project of 1946 will appear in a forthcoming publication: Wm. Duncan Strong and Clifford Evans, *Cultural Stratigraphy in the Virú Valley, Northern Peru, the Formative and Florescent Epochs.*

The two specimens are fragmentary; i.e., only the legs themselves rather than the whole vessel have been preserved. They are probably from tripod vessels. The scarcity of the tetrapod form in the Central Andes greatly reduces the possibility that the legs could be from tetrapod vessels.

The legs are hollow and pointed-conical in shape. The one whole specimen is 6.6 cm. high and is 5.5 cm. at the widest part across the top. It then tapers to a point at the bottom. Both legs are straight walled, not bulging or rounded.

These two examples are from the Castillo de Tomaval site in the Virú Valley. One was found in the main cut (Cut

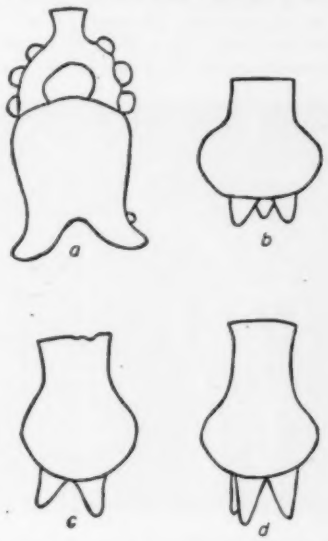

FIG. 110. Viru Valley tripod and tetrapod vessels.

I) in the 0.75–1.00 meter level, which puts it in the Upper Gallinazo period. The other example was found in the lowest level of the fill of Room I, an adobe living room just west of El Castillo. The dating of this room was difficult because the strata levels were not distinct. However, from the types and percentages of pottery found in the fill it seems to belong in the Middle-Late Gallinazo period.

We, therefore, have legged vessels in the Virú Valley during Gallinazo times. Unfortunately, the wider relationships of this type, Castillo White, Red, Orange, are not yet known. It seems to be an imported type in the Virú Valley. Ceramic painted decoration during Gallinazo culture times in the Virú Valley was achieved primarily through negative, not positive painting techniques. The typical Gallinazo decorated wares are Gallinazo Negative and Carmelo Negative, which are essentially two-color negative-painted types. Except for small amounts of Callejon Three-color Negative and Callejon Unclassified, Castillo White, Red, Orange is the only other polychrome ware present during the Middle Gallinazo period. Towards the end of the

Gallinazo period the Huancaco (Mochica) decorated wares begin to appear.

The designs of Castillo White, Red, Orange are very different from Puerto Moorin White-on-Red (Salinar culture) and probably did not develop out of this earlier white-on-red decorated ware. The Castillo White, Red, Orange decoration also bears little resemblance to the later Huancaco decorated types, which succeed those of Gallinazo times. The source for Castillo White, Red, Orange, therefore, should probably be sought somewhere outside of the Virú Valley. Castillo White, Red, Orange comes into the Virú Valley at approximately the same time and in approximately the same small amounts as the Callejon-like or Recuay specimens. The source of the influence which produced Castillo White, Red, Orange may well be the same as that apparently producing the Callejon or Recuay wares, i.e., the North Highlands of Peru. This would make the legged form pre-Expansionist in the North Highlands, something already suspected by Mr. King.

Another interesting vessel type was found by the Columbia University Expedition in a burial at the Gallinazo site. This vessel, however, may not be strictly considered a tetrapod vessel, for the four legs are part of the modeled form itself rather than separate and distinct units for support. It is a strirrup-spout bottle modeled in the form of a fruit (probably representing a pepino) with four curling legs on the bottom (Fig. 110, *a*). The vessel was found associated with a Carmelo Negative vessel (corn-popper shape) and a plain-ware jar which places the tomb in the Gallinazo period. Rebecca Carrion Cachot,[3] uses this same vessel as an illustration of the Chavin type in the Virú Valley. Bennett,[4] however, believes that it belongs to the Late Gallinazo period and is evidence of a new influence (possibly from the Mochica culture slightly to the north) in the Virú Valley. Larco[5] shows a similar vessel. He does not attempt to place it chronologically except to say that "no es Cupisnique."

In addition to these early period tripods we also have a post-Expansionist form not illustrated for the North Coast by Mr. King. We actually have three examples of such tripods, none of which are the open bowl form. The three vessels are from later period burials at the Huaca Negra site. They are all polished blackware. Two, from the same grave, are globular bodied jars with medium to tall slightly outflaring necks (Fig. 110, *c*, *d*). They have solid pointed conical legs. The other vessel from another grave at Huaca Negra, is a squat, ovoid jar with a medium tall, straight neck (Fig. 110, *b*). It has short, solid conical legs.

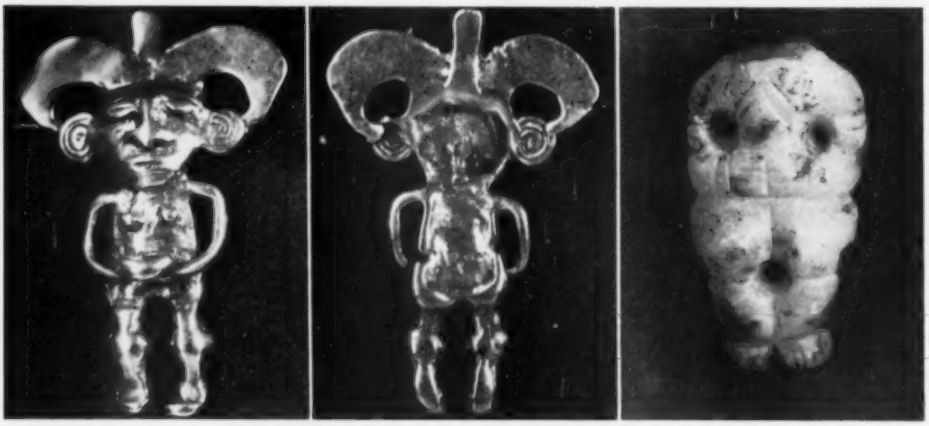

FIG. 111. Figurines of gold (*left*, *center*) and stone (*right*) from Yaguajay, Banes, Cuba. (Orencio Miguel collection.)

The late Virú tripods are most like the ones illustrated by Mr. King for the North Highlands and the Central Coast, but the latter do not seem to have the distinctly taller necks typical of the Virú tripod jars.

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October, 1949

[3] Rebecca Carrion Cachot, "La cultura Chavin," *Revista del Museo Nacional de Antropología y Arqueología*, Vol. 2, No. 1, pp. 99–172, 1948.

[4] Wendell C. Bennett, "The Gallinazo Group, Virú Valley, Peru," *Yale University Publications in Anthropology*, No. 43, in press.

[5] Rafael Larco Hoyle, *Los Cupisniques*, p. 15, lower right hand plate, 1945.

DISCOVERY OF A PRE-COLUMBIAN GOLD FIGURINE IN CUBA*

The hills of the *barrio* of Yaguajay in the municipality of Banes, Cuba have yielded a number of rich finds of archaeological material.[1] To these was added in 1948 a

* Paper delivered at the Seventh National Congress of History, Santiago de Cuba, in November, 1948.

[1] Several of these were reported by us at the Sixth National Congress of History in Trinidad, Cuba: *Descubrimiento y excavación de un montículo funeral en el potrero "El Porvenir"* and *Objetos raros de la cultura Taina en-*

gold figurine, which is of importance as the first such specimen to be reported from the Antilles.

The figurine measures 48 mm. in height, weighs 14.1 grams, and has been cast from 10-carat gold (Fig. 111, *left*.) It portrays a naked woman, standing and holding a small vessel at the height of the stomach. The head is adorned with three stylized tufts of feathers, and two disks project from the ears in the form of shell helices. The face, nose, eyes, and mouth are very similar to those of the clay, shell, bone, and stone figures of the Banes region (e.g., Fig. 111, *right*). The two breasts stand out from the body and the legs are in the form of nodules; although provided with feet, they lack toes.

In the rear (Fig. 111, *center*) can be seen traces of casting, as well as depressions and imperfections which indicate that the artisan carefully finished only the front of the specimen. There are remnants of a ring at the height of the neck, through which a cord for suspension of the figure was undoubtedly passed.

The figurine was found by itself in a yard near the rural school at the village of Santana. While it did not lie in refuse of habitation, potsherds and several petaloid stone celts have been obtained on the surface of the ground in the vicinity. Indeed, the whole area of Yaguajay is covered with such remains, some of which have been eroded from the refuse deposits as a result of the torrential rainfall while others have been plowed out. The figurine was in the very middle of the Yaguajay area, with the important village sites of El Porvenir and Cerro de Yaguajay 300 meters to to the east and to the west respectively.[2]

Some years ago, a stone figurine was found at a higher elevation about 200 meters to the southwest in fields near the house of Sr. F. Cordovés V. This object has a height of 30 mm. and appears to be made of quartzite (Fig. 111, *right*). It lacks the head, but resembles the gold figurine in the position of its arms, hands, and feet, as well as in having nodule-like knees.

Although I know very little concerning pre-Colombian gold work, it is evident that this metal was given singular preference among the higher cultures of the American continents. The Spanish galleons carried gold seized from the Indians of Columbia and Panama to Spain; some of these treasure ships were wrecked on the coasts of Cuba and Florida; and the local Indians apparently obtained specimens from these shipwrecks, which they added to their ceremonial equipment.

Gold figurines similar to the Cuban specimen have been found in both Central and South America.[3] The Central and some of the South American figurines differ, however, in having a fineness of up to 22 carats and a ductility which has permitted them to be hammered into the desired shapes. The Cuban specimen has more resemblances in its technology to such South American goldwork as Chimu of Peru and Chibcha of the Bogota region in Colombia.

Was the figurine brought to Cuba by some migrating group of Indians who taught gold-working to the natives of Yaguajay; was it the product of trade between the natives and the inhabitants of the continent; was it recovered from the wreck of a Spanish galleon; or are we dealing with an autochthonous object? Whatever the answer, we need to learn more about the life, handicrafts, and arts of the Cuban Indians, whom the Spanish chroniclers made to appear a backward race, completely lacking in art and so aggressive that it was necessary to exterminate them.

ORENCIO MIGUEL ALONSO[4]
Banes, Oriente, Cuba
October, 1949

contrados en el cacigazo de Baní. See also Irving Rouse "Archeology of the Maniabón Hills, Cuba," *Yale University Publications in Anthropology*, No. 26, New Haven, 1942, pp. 90–107.

[2] Rouse, *op. cit.*, pp. 96–7, 103–7.

[3] E.g., Pal Kelemen, *Medieval American Art*, New York, 1943, Pls. 202, *b*; 217, *c*; 225, *c*.

[4] Translated by Irving Rouse.

A REPORT ON RECENT ARCHAEOLOGICAL INVESTIGATIONS IN THE LAGÔA SANTA REGION OF MINAS GERAIS, BRAZIL

As a supplement to the recent review of H. V. Walter's book, *The Prehistory of the Lagôa Santa Region*,[1] some additional information about the nature of his recent archaeological work is of interest. After the completion of our own year of archaeological field work in the Lower Amazon, three days were spent in the Lagôa Santa Region, Belo Horizonte, Minas Gerais with Mr. H. V. Walter studying his collections, and visiting and excavating with him some of the rock shelters and caves. Two sites, not mentioned in his report, are of such archaeological importance in the preceramic cultural history of South America that they should be brought to the attention of other archaeologists.

By way of introduction, it should be stated that Mr. Walter, the British Vice-Consul in Belo Horizonte, is primarily interested in paleontological data, a quest which for fifteen years has led him to extensive exploration at his own cost in the caves in and around the Lagôa Santa region. Those he has explored in recent years have produced artifacts, and there being no interested specialist to whom he could resort, Mr. Walter has taken upon himself the added task of their excavation. The specimens, catalogued with data on circumstances of discovery, he has preserved, along with his extensive fossil collections, in the basement museum of his home in Belo Horizonte due to a complete lack of local, state or federal interest in the scientific or educational importance of his material. Because of a primary interest and more extended research in paleontology, the recent report dealt only briefly with his archaeological finds; however, much of the material in his collections, along with the associated field data, would warrant a careful study and classification by trained archaeologists. Two of his most recent excavations, Mãe Rose and Eucalyptus (still in progress), observed by us and not mentioned in his recent publication, are of special significance to American archaeologists.

In a natural limestone cave, called Mãe Rosa, about 15 km. drive from the small town of Pedro Leopoldo, which is 50 km. from Belo Horizonte and a few kilometers southeast of the cave Lagôa Funda, Mr. Walter has ex-

[1] AMERICAN ANTIQUITY, Vol. 15, No. 2, pp. 167–8, October, 1949.

cavated half of the the total cave deposit and discovered a mixture of human bones and extremely crude stone axes and *quebra cocos* (anvil stones). The structure is an arched, water-bored limestone cave, approximately 15 m. wide at the mouth, roughly funnel-shaped, and ending in a long, dead-end tunnel 1 m. wide and almost 2 m. high. In the front portion of the cave the floor refuse has been excavated to a depth of 2 m. The deposit goes deeper, but the great expense involved in hauling away the accumulated waste-dirt in order to deepen the excavations has prohibited the continuation of this stratigraphic excavation. The deposits in the tunnel had not been touched and a little raking

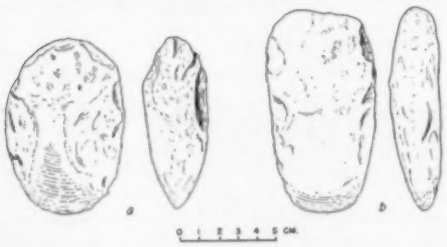

FIG. 112. Crude hand axes from the preceramic horizon of the Lagôa Santa region, Minas Gerais, Brazil. *a*, Mãe Rosa cave. *b*, Eucalyptus rock shelter.

beneath the surface accumulation of spalled-off rocks and powdery dust produced a small stone ax (Fig. 112, *A*) and several anvil stones on or just below the surface. This hand ax, plus the ax series Mr. Walter has found in this cave, are almost without exception made of one of the diorites, diabases, or granitic rocks of the region, and are all made either from a small, naturally rounded pebble, roughly dressed by percussion, or from a small core, with the bits ground. The polishing is always limited to the formation of the bit, never carefully executed and with only a limited amount of percussion-shaping to develop the gross outlines of a small hand ax. The anvil stones are a piece of igneous rock or water-worn pebble which through usage in breaking the hard nuts of the Macaúba palm (same usage today) forms a slight rounded depression in the center from 0.5–1.5 cm. in diameter and varying from 0.1–1.0 cm. in depth. No pottery has been found in the cave. Although many scraps of human bones and two complete human skulls came out of the refuse, no complete skeletons have been recovered. Many animal bones are scattered in the refuse, but up to the depth of the excavated refuse, none represent the early Pleistocene fauna (giant sloth, armadillo, etc.) of the region. Due to the preservative conditions of the limestone cave, the bone material is in excellent condition. In addition to the stone artifacts a bone awl 15 cm. in length with a long, slim, tapered point, scraps of bone projectile points, and half of a mussel shell containing red ocher have been removed from the refuse of Mãe Rosa. On the rolling hill 500 m. below the cave, thick, plain, tan sherds with sand and rock temper are scattered thinly over a large area. This ceramic-bearing site is not related to the stone ax culture of Mãe Rosa, but appears to be the same ceramic horizon as the upper level material from the Eucalyptus rock shelter.

Since a large rock shelter was threatened with destruction by the construction of a cement factory and by the removal of the rich dirt for banana plantations, Mr. Walter began excavations early in 1949. The rock shelter, called Eucalyptus, is near the top of a hill just a few kilometers from the city of Leopoldo. The block of limestone is about 20 m. high with a high, arching roof protecting the floor for about 15 m. outward from the rear rock wall and for 35 m. along the rock face. The accumulation of the refuse made the present floor level 1 m. above the surrounding land. Excavation revealed a refuse accumulation of ash, charcoal, rich black dirt, and artifacts from the surface to a depth of 1.50–1.75 m., resting on an uneven natural granite floor. Artifacts are sparse per cubic meter of dirt, but a large and interesting series has been removed. Several flexed and completely articulated skeletons (held in articulation due to lime encrustation) were found just a few centimeters below the surface near the center part of the back wall of the shelter. Large sherds of a thick ware (orange to tan surfaces; light to dark gray core; surfaces smoothed but not polished; hardness 3; coarse sand and/or sherd temper; body wall thickness 1.0–1.5 cm.; rounded, direct rim) occur sporadically on the surface to a depth of no more than 25 cm. Associated with this material are a few completely ground and polished axes. In the level between the ceramic horizon and the natural cave floor, the artifact material resembles that of Mãe Rosa with a few additions: crude, roughly-shapen hand axes with only the bit faced by abrasion (Fig. 112, *B*); unshaped hammerstones; choppers from broken, natural pebbles or roughly-shaped cores; a large number of clear quartz crystals; broken quartz rejects; flakes and five rudimentary triangular points with short stems; complete and fragmentary bone points (Fig. 113); stones with traces of red pigment; and a large number of *quebra cocos* (anvil stones). Many of these anvil stones have a more angular and conical depression caused by the quartz crystals broken on this anvil to produce flakes for the arrow points. As with Mãe Rosa cave, no fossil Pleistocene animal remains occur in this rock shelter. The complete excavation of the rock shelter at the close of

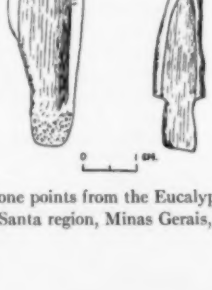

FIG. 113. Bone points from the Eucalyptus shelter, Lagôa Santa region, Minas Gerais, Brazil.

the rainy season should add more specimens to the already large series of artifacts, supplying considerable data on the pre-pottery cultural horizon of the Lagôa Santa region.

The final conclusions about the development of culture in the Lagôa Santa region await the completion of the excavations and the detailed analysis of the materials from these caves by a trained archaeologist. The archaeological data produced by these two finds and those described by Walter in his recent publication, coupled with the abundance of fossil fauna uncovered by both Lund and Walter, provide good evidence to support the claim that an extensive scientific expedition combining paleontology and archaeology would be most profitable in the state of Minas Gerais. The limestone outcrops with innumerable rock shelters and caves are not limited to the Lagôa Santa region near Belo Horizonte, but extend both south and west of Belo Horizonte and northward over a hundred kilometers to Montes Claros. At present neither Brasilian institutions nor authorities appear interested in carrying out such a project, but from all indications would cooperate with any organized scientific group willing to undertake the exploration. Until such time when trained archaeologists and physical anthropologists can be persuaded to turn their attention to this promising region, archaeology must depend on the personal efforts of Mr. Walter. What information we have we owe to his persistence and scientific devotion in the face of local and federal indifference and in the complete absence of financial assistance. The magnitude of his accomplishments can perhaps be appreciated only by one who has seen the size of the caves and the tons of dirt removed a shovel-full at a time over a period of fifteen years.

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November, 1949

BOOK REVIEWS

Tepexpan Man. HELMUT DE TERRA, JAVIER ROMERO, and T. D. STEWART. Viking Fund Publications in Anthropology, No. 11. New York, 1949. Pp. 160, 38 pls., 23 figs.

The discovery of a human skeleton in the Valley of Mexico, in the sediments of a part of Lake Texcoco now dry, needs no introduction to archaeologists. Since the discovery on February 22, 1947, it has been one of the most talked of events in American archaeology. The unique method of delimiting areas of resistence to radio waves has captured the imagination of everyone, while the general thesis that here at last is an "Ice Age" man in the New World has been argued pro and con. Most of the contention centers on whether the human skeleton was in primary association with lake sediments containing remains of elephants, or a later intrusion, perhaps a burial sunk from a higher level, and hence not of great significance. While the discoverer and others insist that there is no question of intrusion, the careless method of excavation makes it impossible to be absolutely sure of this point.[1]

In the first 86 pages Dr. de Terra describes the geography, geology, climatic changes, fossils, and certain archaeological remains believed to pertain to early human occupation of the Valley of Mexico and immediately surrounding areas, i.e., in late Pleistocene times and after. Most of this is background which will give the reader a broad perspective of the particular sediments at the fossil site. Dr. de Terra also explains the use of the geophysical device for mapping areas likely to contain bones (suggested to him by Dr. Paul Fejos and applied in the field by Dr. Hans Lundberg), and the circumstances of the actual discovery, neither of which need be repeated here. There follows Dr. Romero's full and lucid description of the skull and other bones, some of which were recovered from the excavated soil in subsequent weeks, and other pertinent comments. On being called to the site on the day of discovery, Romero noted that "the skull had been removed and then replaced so that visitors might see it in situ." He was convinced, however, "that the skull and the layers in which it was found showed no signs of intrusion" (p. 90). There is a discrepancy in the distance of the skull below surface, de Terra giving it as 48 inches (p. 36), Romero as 107 cm. or about 42 inches (p. 90). One wonders whether the difference may be due to the removal and replacement. Romero states that the individual was flexed, the frontal plane of the thorax facing down. On the same basis as that used by Weidenreich, namely the "strongly developed muscular tuberosities" (rather than the skull or greater sciatic notch), Romero believes the individual was male. A tabulation of eight criteria (p. 97) indicates the age at death was between 55 and 65 years.

Six appendices include a list of the bones found; discussions of comparative morphology by Weidenreich and Stewart; a study of the jaws by S. Fastlicht; a description of the endocranial cast by C. J. Connolly; an examination for blood-group substance by W. S. Laughlin; and finally, Stewart's comparisons with other American skeletal remains for which considerable age has been argued. While the appendices are all interesting studies and fine examples of cooperative research, they naturally depend quite largely for their meaning on the presumed age of the skeleton, about 11,000 years in de Terra's interpretation.

The publication is attractive in format and the photographs superbly clear. The attractiveness is decidedly marred by numerous and often exasperating typographical errors, particularly in text references to plate and figure numbers. After trying to check some of the correlations in the text with those in Table 1, I was informed by Professor Martinez Del Rio that the items in column 6 (Climate) should be moved downward one step in the upper section;

[1] Glenn A. Black (AMERICAN ANTIQUITY, Vol. 14, pp. 344–6, 1949) aptly criticizes the excavation method and discusses the " . . . possibility, even probability, that there was a pit immediately above the spot where the skull reposes." Dr. Jesse D. Jennings in December, 1949 lent me a manuscript in which he offers many points of criticism, some of them paralleling my own, but concentrating more on the deficiencies in the actual method of excavation and recording.

thus "Dry Spell" belongs opposite Stage V; "Moist Spell" opposite Stage IV and also opposite "Early Archaic older than 300 B. C.," and so on to the top. Space will not permit listing all the typographical errors, but they will be obvious to any reader.

A large topographical map (Fig. 2) of the lake bed and hill slopes in the vicinity of Tepexpan and Totolzingo villages, by K. Segerstrom, greatly aids one in following the text. A longitudinal profile from the marginal hills to the present shrunken lake (Fig. 3) also aids the reader, but as the deposits seem merely to be generalized from the surface map, rather than from any actual examination of the strata by test holes, its application to the geological problems is limited. One would think that a series of test holes to map the strata both upslope from the skeleton and downslope to the present lake would be one of the first requirements in such a study; at least, there is no mention that this was done.

In briefest terms, de Terra's interpretation of the Tepexpan skeleton is as follows: The search for ancient man in the Valley of Mexico had revealed several suggestions of the contemporaneity of man with geological deposits of known antiquity and animals now extinct. The lake bed area near Tepexpan promised to yield more remains of mammoths and with them, perhaps, artifacts. Excavation for bones roughly located by the geophysical device revealed instead the skull, and eventually most of the skeleton, of a human being. This is reported as being in lake sediments of the El Risco formation, equated in age with the upper part of the Becerra, "in the waning stages of the Ice Age" through (*a*) fossils of mammoths found previously, and possibly other extinct Pleistocene mammals; and (*b*) stratigraphic position beneath a thick caliche formed during a long dry and warm period which followed the last retreat of Wisconsin glaciers by several thousand years.

In reading and re-reading all the passages pertaining to the skeleton and its geological affinities, I kept in mind that three principal questions would have to be answered clearly and incontrovertibly before de Terra's interpretation would be accepted as the best one possible in our present knowledge: (1) identification and geological age of the El Risco formation; (2) association of the skeleton with this formation; and (3) valid inferences which could be made for climatic changes, vegetation, fauna, lake stages, etc., for the Valley of Mexico in late-glacial and post-glacial times. Some 40 pages of notes were taken down, after which many were crossed off as minor issues or careless errors. The remainder were then regrouped under a series of questions which seem to me crucial for the correct interpretation of the human fossil. As this publication is said to be only a summary of the field work, these questions may have been resolved more satisfactorily than the publication indicates.

1. *How do the Becerra and El Risco formations differ?* The Becerra, named by geologists Bryan and Arellano, is well recognized in the Valley of Mexico as a late Pleistocene alluvium containing the fossils of numerous mammals now extinct and dating in the last stages of the Wisconsin glaciation. The El Risco, named by de Terra, is mentioned variously as "the younger sandy member of the Upper Pleistocene Becerra formation" (p. 26); a "lacustrine facies of the later Becerra formation" (p. 50); the "fluvio lacustrine sands underlying the younger lake deposits at El Risco" (p. 23); and by similar phrases. At times "Upper Becerra" or "Younger Becerra" appear as synonyms for El Risco. Except in the confusing manner to be cited, "Becerra" is not used for deposits under the flat lake-bed area. Becerra alluvium is found in thick beds on the hillsides some distance north, and is the material into which El Risco Lake I cut a beach at contour 2,265 m. (Fig. 3). This lake apparently was responsible for the deposition of the El Risco formation, which was in turn cut into a beach by a lower lake, El Risco II, at contour 2,258 m. On the basis of this superimposition it seems clear that the El Risco formation is later than Becerra, unless the latter is qualified as Late or Upper. Where the Becerra proper is exposed on the hill slopes between contours 2,265 m. and 2,320 m., it is "heavily calichized on top," but below contour 2,265 m. "it is overlain by gray sand with gravel layers and tuff" (p. 23), which, one may suppose, are the materials of the El Risco formation.

El Risco is otherwise described as clay, sand, sand and clay, clays and gravel, sand and ash, sand and tuff, and muck. At one point the average size of rolled pebbles in El Risco material is said to be 2 to 3 inches, while toward the present lake it "turns gradually into a fine diatomaceous earth" (p. 26). At another point we read (p. 31) that "remains of plant fiber occur in the El Risco muck" and in the next three sentences the phrase "Becerra muck" occurs three times, although up to here there is no mention of Becerra in the flat lake-bed area. On the basinward slope, yellowish loessial deposits formed between Becerra and El Risco alluvium, probably deposited in a dry interval marked by "the erosional disconformity between the El Riscò and older alluvium" (p. 28). Previously, no disconformity was mentioned, only that the El Risco lacks the caliche pebbles seen in Becerra, and that "caliche soils developed on the slopes, especially on the Becerra clays and soils."

It is apparent from these and other statements that the two formations are not only distinct but separated by a time interval sufficiently long to bring about (*a*) an erosional disconformity, (*b*) the formation of caliche or calichized soils, (*c*) loessial deposits, (*d*) a lake and/or land subsidence (see Point 4); and (*e*) extinction of most, if not all, the characteristic late Pleistocene mammals, depending on the evidence for their survival into El Risco.

By substituting "Becerra" for "El Risco" here and there, the author tends to give the impression that they are but slightly different phases of the same formation and that any temporal difference between them is negligible. This could, of course, be the case, if it could be shown that their fossil content is quite similar.

2. *What extinct fauna is associated with El Risco sediments?* Despite repeated assurances that "Tepexpan Man" was associated with elephants in the "waning stages of the Ice Age," extremely few data are given in support of it. The sole evidence of a vertebrate anywhere near the human skeleton is the leg-bone of a pied-billed grebe 15 feet away, a bird that is also modern here (p. 43). On p. 27, de Terra states that he collected fossils " . . . from the

Becerra and El Risco deposits. The sandpits near Totolzingo yielded teeth of horse and deer and bones of elephant and turtle." Only two of these vertebrates became extinct, and it is small help not to know which of the two formations they came from. On p. 44, the fossils found on "the oldest of the El Risco beaches" are listed as horse, gopher, and deer. "Through this paleontological perspective the habitat of Tepexpan Man reveals itself as one endowed with grazing animals requiring more luscious vegetation than there is today." Aside from the question of whether horse and deer could not have grazed here until fairly recently, we may note that the fossils are from El Risco Beach I, which was cut by wave action into the richly fossiliferous Becerra formation, and that de Terra himself correlates "Tepexpan Man" with an El Risco Beach III (p. 52 and see Point 3 below).

On pp. 44–5 a rather full listing of Upper Pleistocene or Becerra vertebrates from various stations appears. There is, however, no comparable list for the El Risco deposits.

The only extinct vertebrate for which a direct association is claimed is the mammoth. Seven occurrences of its remains have been reported in the vicinity (p. 21), of which four fall within the limits of the map (Fig. 2), and these four were "in various states of preservation." However, six of the stations lie within an area of 3 square kilometers, and de Terra says of them that Tepexpan "had been the scene of a prehistoric drama involving the extinction of an entire herd of elephants and perchance of prehistoric man." If I understand this passage correctly it means that a herd three square kilometers in dimensions was here slaughtered by man, the scattered fossils being the parts so far uncovered.

Although in various states of preservation, the remains are referred to as "elephants," "skulls," and "bones" without any itemization of the degree of articulation in any case. Two stations, both excavated by Arellano next to the long drainage ditch, are entered on Figure 2 as ARV I and ARV II. The human skeleton was 25 m. north of the ditch 320 m. west of ARV I, and 620 m. east of ARV II. These numbers are not used in the text but correspond to the profiles in Figure 7, *A* and *C* respectively. Station ARV I included an articulated foreleg and inverted skull, beneath which was an obsidian flake. As this fossil was undoubtedly in primary position, it must be noted that Arellano clearly shows it wholly within a stratum *below* that immediately under the caliche with which de Terra associates the human fossil.[2]

De Terra's own Figure 7, *C* shows the articulated leg and skull in a stratum lower than that of the human. The state of preservation and articulation of ARV II is not mentioned and it was possibly but a single bone. This fossil is shown as immediately under the caliche (Fig. 7, *A*) and twice as far away as the first. One wonders if it is possible that lake currents or wave action occasionally transported a bone or tooth from the Becerra formation into which El Risco Lake I cut a beach. If this is out of the question, it is nevertheless the author's obligation to present a clear account of the fossils claimed to be in association, and to eliminate doubt as to their primary or secondary occurrence.

The identification of the two sub-caliche layers is also important. Was the stratum with the articulated fossils actually Becerra proper, and the higher one perhaps the only one that could correctly be called El Risco? Or are both strata El Risco and should this formation be subdivided, with the elephant in the lower but perhaps not surviving into the upper?[3]

3. *What is the difference between El Risco Lake III and the Zacatenco lake?* Since the geological and climatic discussions are centered on El Risco Lakes I and II, it comes as a surprise to see "Tepexpan Man" correlated with an El Risco Lake III in Table 1. Astonishment increases when a search of the publication reveals but a single sentence on this lake: "A third and lowest El Risco beach is not recorded in this region though it is well exposed some twenty kilometers south at El Risco" (p. 28). How is the skeleton to be correlated with a lake not recognized in the vicinity? There is no mention that even a transit line was run to establish the level of this lake on the Tepexpan slope. And, how could the human be "correlated" with such a lake unless (*a*) its level was lower than both the Zacatenco Lake and the skeleton (in which case it could have been only slightly higher than the Colonial Lake), or (*b*) the individual had drowned or otherwise sunk to the bottom of a lake which did cover the site? The latter is not at all improbable, and I see nothing in the flexed, face-down position of the skeleton which might rule out its deposition in a lake. This aspect is not suggested at any point, nor is there any attempt to reconcile the problem posed by the "correlation."

The Zacatenco Lake level, which is dated at about 2,000 B.C. in Fig. 12 and rose to contour 2,248 m., was about 10 m. lower than El Risco Lake II, 8 m. higher than the Colonial Lake, and about 6 m. higher than the lake-bed surface above the skeleton. The Zacatenco beach is the "youngest of the recognizable shorelines," and although plowing and slopewash have obliterated much of it, a "deposition of lime (thinolite) on isolated basalt boulders or on the [beach] shingle [is] a feature highly diagnostic for this youngest beach" (p. 32). The caption for Plate 4, *A* reads: "White Zacatenco beach gravel overlain by sherd refuse; volcanic rock below encrusted with thinolite marking lowest El Risco beach (Upper Pleistocene)." Since the thinolite was said to be highly characteristic of the Zacatenco beach, this caption is either another typographical error or a gross indication that the two beaches were confused in the field.

If there were three distinct El Risco lakes, all preceding the long post-glacial dry period during which the caliche under the lake bed surface was forming, it would be instructive to know whether they were temporary halts in a constantly falling lake, or resurgent lakes, each smaller than the preceding. There were two or more strata under the

[2] A. R. V. Arellano, "El elefante fosil de Tepexpam y el hombre primitivo," *Revista Mexicana de Estudios Antropológicos*, Tomo VIII, pp. 89–94, Mexico, D. F., 1946.

[3] A serious confusion is plainly evident in Plate 3. Panel *A* has five numbered layers, panel *B* six, yet the caption says that the layers of *B* are the same as *A*, and Stratum 6 is El Risco. If this is so, Stratum 5 is nameless. It may be suspected that Stratum 6 is Becerra (with the mammoth fossil) and that 5 is El Risco in both panels.

caliche where the mammoth and human fossils were found; which of these was connected with each of the three El Risco lakes? For example, on Figure 2 a close connection is apparent between the lower limits of the Totolzingo soil or "tuffaceous earth" and the Zacatenco beach line, even though the Totolzingo soil was derived from materials of the Becerra formation. Similarly, each of the three El Risco lakes must have stood stationary long enough to have had an effect on the earth it covered, or to deposit a new film of sediments.

A pumice fall, 3 to 5 feet thick on the slopes, was deposited when "the El Risco lake was shrinking" (p. 28), and is shown in Figure 3 as lying on the lake bed surface *below* the Zacatenco beach. The caliche layer is not overlapped by this pumice in the figure. If it fell between the El Risco III and Zacatenco lakes, does it occur downslope from the latter because the El Risco III lake was smaller, or because of slopewash and wave action? A slight limonitic stain occurs in the pumice, hence "these ash falls occurred at the closing phase of the last Pluvial when vegetation was still sufficient to produce pedalfer type of soils" (p. 29). One wonders what the vegetation was like at the time of the Colonial Lake, or at any rate within the last two or three millenia.

4. *How do the El Risco lakes reflect climatic change?* One of the most difficult aspects of the Tepexpan problem is that the lake increases were only partly the result of precipitation increase, partly the result of deepening of the basin by land subsidence. Dr. de Terra has wisely given only his estimates and not attempted to provide conclusions as to the final effects of each factor. In Becerra times, "the local base level [of the Lake Texcoco basin] must have been at 2,260 m. above present sea level." The elevation of 2,260 m. is, however, arbitrarily chosen, for there is no beach line or deposit mentioned at this level. The Becerra formation on the hill slopes is shown as steeply slanting, with its top at contour 2,290 m. If this top represents the approximate base level of the valley when Becerra alluvium had ceased to accumulate, the Colonial Lake (2,240 m.) lay about 50 m. lower. I therefore do not understand how a presumed subsidence of 20 m. since Becerra times is to be reconciled with an actual difference of about 50 m. plus the depth of the Colonial Lake, whatever it was. That a subsidence of 20 m. is not unreasonable is deduced from known movements of bench marks "by earth tremors and subsidence" of 1 to 2 m. since the close of the last century (p. 19). Even the bench mark at Tepexpan has lowered in modern times.

El Risco Beach I was cut at contour 2,265 m. by a lake rise "against a slope steepened by basin subsidence" (p. 28). De Terra postulates that the basin floor at that time was at contour 2,255 m., hence El Risco Lake I was only about 10 m. deep. El Risco Beach II was formed when "the lake must have dropped by 7–8 m.," and this drop may have "been caused by [further?] basin subsidence forcing the water off the slopes, and to collect in the deepened valley center." It is problematical whether there was any appreciable lake in Tacubaya times (preceding Becerra), perhaps only an extensive marsh in a very shallow basin. In Becerra times, " . . . the surface must have been flat or nearly so. In other words, the present slope did not exist then . . . " (p. 27).

While not directly connected with the human skeleton, this problem indicates that fluctuations in the height of the ancient lake were only partly reflections of climatic changes; correlations on a climatic basis with other North American interior lakes that were not so affected by land subsidence will be precarious.

5. *How and when was Interformational Caliche III formed?* This is the famous caliche layer under the lake-bed flats where the human skeleton and Arellano's mammoth stations were found. It is the third of three interformational caliches; I is ½ to 1 inch thick, following the Tacubaya stage of soil formation; II, ½ inch thick, follows the "Old Becerra alluvium"; and III, 4 to 10 inches thick, follows the "Young Becerra alluvium" to which the three El Risco lakes are equated (Table 1). One is immediately struck by the thickness of III in comparison with I and II. It must, as de Terra states, have been formed during a prolonged period of dry climate and low lake level, a time also marked by recession or disappearance of mountain glaciers (in this case those on Iztacchihuatl). These warm and dry conditions after the final retreat of Wisconsin glacial ice certainly agree well with what Europeans call the "Post-glacial Climatic Optimum" and which Antevs now terms the Altithermal age in North America. Antevs estimates the onset of this period at about 5,000 B.C.,[4] not 7,000 or 8,000 B.C. as de Terra gives it in Table 1. There is general agreement that for some 2,500 to 3,000 years, or up to 2,500 to 2,000 B.C., this dry period brought about more intensively desert conditions over large parts of North America than had been known in previous Pleistocene interglacials, and that both the northern and southern hemispheres reveal its world-wide effects.[5] Thus the relative thickness of this caliche agrees well with the conceptions of the length and intensity of the post-glacial optimum.

Caliche is said not to be forming at present in the Valley of Mexico (annual rainfall about 588 mm.), but is "formed on dry lake flats" in San Luis Potosi state, where 300 mm. of rain now falls, slightly more than half that in the Valley of Mexico. Under the lake-bed flats at Tepexpan, Caliche III lies about 15 to 25 inches below the surface and is quite uneven in thickness and lateral distribution (Fig. 4). On the lake-bed margin this caliche has "undergone leaching through subsequent periodic as well as seasonal fluctuations of lake level, of groundwater and surface weathering . . . it is missing altogether over considerable areas, or if present, it is broken up in fragments. . . . It is present, if in much reduced form, beyond the map limits way out toward present Lake Texcoco below younger lake deposits, where saline deposits precipitated themselves" (p. 29). Far out toward the present lake it is only 1 inch thick.

Inasmuch as some caliches are subsurface formations, it

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[4] Ernst Antevs, "The Great Basin, with Emphasis on Glacial and Postglacial Times," *Bulletin, University of Utah*, Vol. 38, No. 20, pp. 168–91, Salt Lake City, 1948.

[5] For a summary of various theories and a critical review, see H. C. Willett, "Long-Period Fluctuations of the General Circulation of the Atmosphere," *Journal of Meteorology*, Vol. 6, pp. 34–50, Lancaster, Pa., 1949.

seems possible that Caliche III and the overlying soils might have formed simultaneously. If so, they represent a single time period rather than two successive ones such as de Terra has described. At least, some discussion of the manner of caliche formation, particularly of Caliche III, would be most welcome in connection with the present problem.[6]

A second question is how it happens that the margins of *both* the caliche and the underlying El Risco muck "almost coincide" (p. 35). This appears very remarkable. Is it not possible that the lake once had a shore at this point, long enough to cut back both the caliche and the underlying "muck"? If so, what is the material which rests against these strata where they end? Since there is grave question that the skeleton itself was actually beneath the caliche (see Point 6), it is imperative that the reader receive a clear explanation of this stratification. Since "El Risco" and "Becerra" are both used in connection with the "muck," it is also imperative to know whether there were two such strata, one of them true Becerra, and if so, whether it, too, was cut back. The reviewer's one outstanding criticism is the lack of a trench profile lengthwise to the lake gradient at this crucial point. This is fully as serious as the presence or absence of a burial pit; indeed, what seems to Black to be a pit line (see Note 1), may be only the contact of the caliche margin with some later lake deposit.[7]

6. *Exactly where was the skeleton?* Plate 5, *C* shows the top of the skull in the trench bottom, something like 1 or 1½ feet out from the back wall. The caption reads "Dr. de Terra looking at skull of Tepexpan Man." Plate 22 shows a trench wall about as roughly gouged as the foregoing, with the skull in a position to which it had been moved "to obtain a better photograph." Plate 23 shows Arellano kneeling before the skull, apparently in the same place as in Plate 5, *C*. In these three photographs *no caliche* is visible in the back wall (unless it is extremely thin). Plate 3, *A*, "wall sections at Fossil Man site, Tepexpan . . . [Layer 5], El Risco sandy clay with position of fossil skull marked." This section plainly shows the thick caliche, about 15 inches below which is a cross, inked in at the juncture of wall and trench bottom. Figure 7, *B* also has a symbol in the same place below the caliche. The skull is said (p. 39) to have been in a clay stratum which is "silty and even sandy in the lower portion and contains root canals as well as freshwater shells and diatoms." This stratum was 18 inches thick "and at a depth of 14 inches below the caliche was found the human fossil."

Putting these photographs and statements together, it is evident that "14 inches below the caliche" is more or less a figure of speech; that is, the skull was 14 inches *lower than* the caliche base, but not literally *beneath* it. If this is not the case, some clarification is due as to which picture really shows the skull *in situ*, and how far it actually lay from the caliche margin laterally, even if but a matter of inches. Obviously the whole question of whether the skeleton was pre-caliche or post-caliche hinges on this point.

There is some suggestion that the skeleton lay on a contact zone of two somewhat different sediments, for "the mineralization of the skeleton varies according to the embedding medium" (p. 39). The lower mandible is more mineralized than the rest, "having lain in a lens of sand." The skull, on the other hand, was filled with *clay*, into which roots had grown through the foramen magnum.

7. *What is the age of the skeleton?* The obvious difficulty of answering this question conclusively should be apparent from the foregoing notes. Perhaps my questions merely result from personal inability to grasp the information that is offered, and those who have visited the site may be more convinced than those who have not. If embedded before the thick caliche began to form, de Terra's estimate of 11,000 to 12,000 years for the skeleton can be taken as reasonable. This figure, as he states, is arbitrary, since it may be raised or lowered according to the time estimates on the phenomena on which it is based. The onset of the postglacial climatic optimum is taken at about 7,000 or 8,000 B.C., which is derived from Antevs' figure of 5,000 or 6,000 B.C. for the beginning of the Altithermal age (or Optimum) in more northern latitudes, such as Europe and the western United States, to which is added about 2,000 years "Since this dry phase most likely began earlier in the subtropical region" (p. 61). Then another 2,000 years or so is added because the skeleton was near the base of the clay underlying the caliche. The thickness of this clay is comparable to that of the Totolzingo marl or earth believed to have been forming for about 2,000 years or between about 2,500 and 200 or 300 B.C. (p. 61).

There is serious question that 2,000 years or any time need be allowed for a difference in latitude for the effects of climatic shift to be felt. Most climatologists now regard fluctuations between glacial and interglacial climate as occurring synchronously in the northern and southern hemispheres. The modern retreat of mountain glaciers on Iztacchihuatl (pp. 54–6, Figs. 11, 12) agrees with glacial retreat over much of the world since about 1850. The subtraction of this allowance from de Terra's estimate would still give an age of about 9,000 or 10,000 years for the skeleton (the estimate for sedimentation up to the caliche level remaining the same). With such a date, association with the mammoth or any extinct late Pleistocene mammal would not be surprising.

If the skeleton does not antedate the caliche, any date from about 2,000 B.C. onward might apply. The Zacatenco Lake, for instance, rose to contour 2,248 m. or at least 6 to

[6] Glen L. Evans, geologist and Assistant Director of the Texas Memorial Museum, Austin, has supplied me with a brief statement of the caliche problem posed here: "The term 'caliche' is commonly applied to impure calcareous rocks in which the calcium carbonate has been secondarily introduced or concentrated. Such caliches characteristically develop at surface or shallow subsurface horizons under arid climatic conditions. Caliche may form as a surficial crust due to evaporation of ascending lime-charged waters, or it may develop at the base of the leached zone of a soil profile, or may form in any of several other ways. Consequently when a caliche zone is used as a stratigraphic marker, an interpretation of its particular origin becomes important. If Caliche III is the result of leaching of an overlying soil, it may be of essentially the same age as the materials immediately above. Whereas, if the caliche formed as a surface encrustation, it may be considerably older than the overlying strata."

[7] A letter from Professor Kirk Bryan states that the caliche and underlying El Risco material were both eroded by the Zacatenco Lake, and directly over the skeleton there was only a paper-thin caliche. Could the thinness be due to the caliche only having started to form again after the Zacatenco Lake had receded beyond this point?

7 m. over the skeleton level, and sediments could have been deposited from the time it climbed over this level until it fell below again.

That the skull morphologically agrees very closely with several of the "Archaic" skulls from the Valley of Mexico, and that the flexed position of the skeleton likewise is quite agreeable with "Archaic" burials, are discussed by Romero. "I wish to point out that when I found these Ticoman specimens I was struck by certain resemblances to that from Tepexpan (compared in Pls. 36 and 37). . . . As can be seen, the traits of some of these Archaic burials show an amazing similarity to those of the Tepexpan find, while the position of skeleton number 31 [from Ticoman] is practically identical. . . . Nevertheless, among the specimens of the Archaic period no fossilization has been encountered" (p. 113). Romero continues, "I must confess that I do not know how the evidence presented can be rightly interpreted" (p. 116). However, assuming that the deposit had been correctly dated geologically, he states that "From the morphological resemblance the only conclusion to be drawn is that people who achieved the known Archaic cultural level during the last centuries B.C. probably inhabited the Valley of Mexico several thousand years earlier . . . " (p. 117).

Here the matter must rest. Stewart is not disturbed by the morphological resemblance to "Archaic" skeletons: "Clearly, then, the modern appearance of Tepexpan Man no longer is to be regarded as inconsistent with the geological setting in which he was found" (p. 141). If the degree of mineralization is the chief factor in Dr. Romero's conclusion, a study of this phenomenon under the specific conditions of soil chemistry and drainage at the skeleton site is in order, as Stewart also suggests. There is a current rumor that Carbon 14 dating is being obtained.

8. *What are the preceramic archaeological complexes in this region?* De Terra is quite correct in emphasizing (p. 65) that prior to 1945 Mexican prehistory began with the "Archaic, " while increasing evidence for far older occupation of the New World made it seem probable that Mexico would reveal similar antiquity on search for it. He has collected artifacts "of very distinct types" from San Luis Potosi, Hidalgo, Mexico, Morelos, and Oaxaca states, and "they are present also in Michoacan, Guanajuato, and Pueblo." He describes the San Juan and Tepexpan "industries" and the "Chalco culture complex," citing various stations and collectors (pp. 65–76), after which relationships with certain discoveries in the United States are very briefly suggested.

The San Juan industry consists of ten "artifacts" from three localities. Eight of the ten "show dulled edges due to water wear." Five are obsidian, four chalcedony, and one is fossil bone. All are from "sandy alluvial gravels of the younger Becerra formation with fossil vertebrates (elephants, horse, deer, antelope, etc.). Geologic age probably from 12,000 to 20,000 years" (p. 67). The cut and beveled bone "point" (Fig. 13, *A*) certainly looks intentionally fashioned. The nine stone objects, called graver, flake, chipped pebble, side scraper, graver and end-scraper, etc., all appear highly problematical as artifacts, bearing only very few and irregular scars. The "gravers" are presumed to have had fine tips, now indicated with projected lines. Eight of the nine being water-worn, they would not seem to be of primary deposition in the alluvium, and perhaps no more than stream-battered spalls of materials common in the region. The statement that "the general typologic character of these artifacts . . . suggests an advanced technique of pressure flaking and a diversified knowledge of tool types" holds no justification in my mind. As "artifacts" they do not appear to rate any higher than the obsidian flake found by Arellano under the mammoth skull at station ARV I; this is called an "artifact" by de Terra in some instances, a "waste flake" in others.

The Tepexpan industry is based on some 50 small objects of quartz and chalcedony at the foot of the basalt cliffs about one kilometer north northwest of the human skeleton; the elevation suggests contemporaneity with both El Risco Beach II and the fossil man (p. 70). Once again, if the man was contemporary with Lake II (or Lake III, as suggested elsewhere)he would have had to sink to the bottom in fairly deep water. Some of these objects are surely definitely shaped artifacts, but again the author strives to increase their meaning. The grooved spall in Plate 10, *E* (probably 10, *A*?) no more resembles the grooving of Folsom points than would any odd chip from any part of the world. To compare the small, stubby, triangular artifact in Plate 18, *A* (not 8, *A*) with Folsom points from Sandia cave, New Mexico, and from it to suggest "Folsom influences" in Mexico (p. 77) is preposterous. The last-mentioned artifact is not from the beach site on which the "Tepexpan industry" is based, but from a looted cave in San Luis Potosi state 150 miles away. To say that the "small gravers and scrapers would not be out of place in a typical Folsom site such as Lindenmeier in Colorado," then to speak of the "folsomoid" affinities of the local industry, is equally unjustified. Analogous scrapers and gravers can be found almost anywhere.

The Chalco culture complex presents an array of very definitely shaped artifacts, including manos, from San Luis Potosi to Oaxaca. With few exceptions they are of a dark, dense variety of basalt, "because collecting was done in areas where this type of volcanic rock abounds" (p. 72). As Chalco, in de Terra's own words, may consist of several different complexes on different time levels, we may hope for its more specific analysis. In belief that it represents more or less continental hunting and gathering peoples of simple material culture from about 8,000 to 2,000 B.C., de Terra draws some parallels with artifacts from Pinto Basin, Cochise, and Ventana Cave. The long, narrow, finely chipped projectile point in Plate 12, *A* is by far the best indicator of a relationship with geologically early remains in the United States, for it strongly suggests one of the newly recognized Plains types.[8] This artifact is assigned to Chalco because it was found in sands of the Totolzingo formation at Tezayuca.

[8] It probably falls within the range of "Nebo Hill points," illustrated by J. M. Shippee in AMERICAN ANTIQUITY, Vol. 14, pp. 29–32, Pl. II. Jack T. Hughes, excavating for the River Basins Survey in the Angostura Reservoir basin, South Dakota, in 1948 and 1949, found points of similar shape which he calls "Long points." Further study will probably reveal that this form is quite widespread.

A small fragment of elephant molar, only 4 cm. long and 7 mm. thick, was acquired from a young man in Tepexpan village. This is assigned to the El Risco formation "because of the specific type of matrix preserved in the recesses" (p. 84). A great deal is made of this tooth as an example of artistic expression of Upper Pleistocene man because it looks like a right human foot with the small toe missing. A half dozen persons who have seen the object have told me they could see no definite carving, and examination of an unworked elephant molar at the Texas Memorial Museum reveals natural convolutions quite like the "toes" of the present specimen.

On the other hand, the three small bone tools in Figure 15, "extracted from the fossil bearing sand of El Risco beach I" near Totolzingo are of great interest and clearly reveal workmanship at the tips. The reviewer wonders why the more definitely shaped artifacts described by de Terra are consistently of secondary importance to the highly questionable ones.

The principal culture periods of the Valley of Mexico, "Archaic," Teotihuacan, and Aztec, are briefly discussed in relation to minor lake rises, mountain glaciation, terraces, and erosion, all of which is important to a better knowledge of man and environment in comparatively recent times. It is held that Vaillant's estimate of "Archaic" beginnings was too conservative and should be pushed back to about 500 B.C. This is reckoned partly on de Terra's dating of 250 B.C. and 350 B.C. on two recessional moraines in the high mountain valleys. It is not clear just how the dates were obtained, but a pushing back of initial "Archaic" dates is in line with a longer allowance for early ceramic cultures by many archaeologists.

Summary. No modern anthropologist has any great qualms about the presence of man in the Valley of Mexico or any other part of the New World in the past 15,000 years or more. Most of us merely wish to know whether this particular individual is really a Pleistocene man. The argument boils down to a matter of confidence in the manner that the case is presented. To the reviewer, this confidence is lacking because of the careless method of excavation, often conflicting passages and inconsistent terminology, and the several crucial matters which seem not to have been done or explained. He is not impressed by the number of times it is asserted that there is "no question" about the interpretation.

The publication probably attempts to cover too much ground. It might well have been devoted to a clear and detailed treatment of the stratigraphic problems at the spot where the skeleton lay. The case for association of mammoths with the El Risco formation is much too vague. More important, from the data given it is possible to visualize the skeleton in three different positions: in the El Risco sediments beneath the caliche; in El Risco but not under the caliche; or in the sediments of a later lake (the Zacatenco, according to Bryan) which eroded both the caliche and the underlying El Risco to margins presumably just back of the skeleton. Considering that nothing is presented to exclude the skeleton having been in the third position, and the authorities are agreed on its close morphological resemblance to the "Archaic" population, I have a strong impression that the skeleton is post-caliche in age. If not actually coeval with the first "Archaic" pottery cultures, it would not precede them by many centuries if this argument is justified. The possibility of a grave pit can probably never be eliminated conclusively, but it seems somewhat less important than the stratigraphic position of the skeleton. In any case, another discovery will be needed to check the first.

To the reviewer, this publication does present a valuable pioneering coordination of geological, climatic, and geographical changes over a long period. While the correlations are often "rule-of-thumb" (e.g., lake maxima associated with glacial maxima rather than with melting; erosion equated with dry climate without mention of topography or gradient), all students of early man will be grateful for a working framework of such scope in Mexico. Although certain to be modified from time to time, as all studies must be, this synthesis must surely be substantial in outline, and to Dr. de Terra goes ample credit for having the vision and energy to bring it thus far.

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Mexican Highland Cultures. Archaeological Researches at Teotihuacan, Calpulalpan and Chalchicomula in 1934/35. S. LINNÉ. The Ethnographical Museum of Sweden, Stockholm, New Series, Publication No. 7. Stockholm, 1942. 224 pp., 333 figs., 6 pls., bibliography, index.

From September, 1934 to June, 1935 Dr. Linné carried on archaeological reconnaissance and excavation for the Ethnographical Museum of Sweden in parts of Puebla, Tlaxcala, and the Valley of Mexico. He was assisted by Dr. Gösta Montell, who also made ethnographic collections for the museum. The volume under review reports in detail on the archaeological work, with the exception of material from the latest horizons, which are identified as Aztec. A burial mound dating from the end of Middle Culture times was excavated in Puebla. Near Calpulalpan in Tlaxcala a small site identified as Teotihuacan II or III in culture was briefly investigated. The most extensive work was done at Tlamimilolpa, within the archaeological zone of Teotihuacan. Here a large complex of rooms was cleared, and several well-stocked graves found beneath their floors. The settlement is assigned by Linné to the latter part of Teotihuacan III, although its precise chronological relation to other parts of the site is still open to different interpretations. Besides these excavations, numerous purchases of specimens were made and some important private collections studied. These specimens are reported and discussed in considerable detail, as are the excavated artifacts.

This handsome volume is a valuable addition to the literature on Mexico and an impressive indication of the vigor and ability of Sweden's Americanists. It adds very important data to our knowledge of Teotihuacan in particular, which, for all the many years it has been studied, is still not as well known as its crucial position in Mexican prehistory entitles it be be. Linné reports in commendable detail on the various aspects of his investigations, lists fully

the contents of all graves and caches, and discusses many important finds at length. There are plentiful illustrations of the collections, mostly watercolors and drawings, of which a few are in color. Their superiority over photographs would seem amply to justify the expense to which the expedition's supporters have gone. Although there are several maps, plans, and sectional drawings to illustrate the excavation, I would have welcomed drawings or diagrams of several details, particularly the platform and associated graves at Las Colinas (p. 65 and Fig. 114) and the thirteen graves under the floors of the Tlamimilolpa ruin (pp. 124–41; only one grave is indicated in the cross sections, Figs. 182–7, and none appears on the plan, Pl. 1). One of the valuable features of the report is the series of clear and thoughtful summaries which close the description of each area, and not only repeat salient facts but evaluate the results in terms of the broadest aspects of Mexican and Middle American research.

Only a few of the outstanding results of the work can be outlined here, together with some comments on the chronological problems raised by the Teotihuacan findings.

In the vicinity of Chalchicomula, Puebla, about 75 mounds (locally known as "teteles") were noted, nearly all of them looted. They are of two types, terraced masonry platforms and rounded earth burial mounds. At San Jeronimo Aljojuca (the same as Seler's San Rodrigo Aljojuca) one of the latter type was trenched and fifteen burials found, some extended and some flexed and seated ("Hockerstellung position"). Artifacts were scarce, but included obsidian flake blades with finely retouched edges, a "cooking pot" (Fig. 19) of typical Teotihuacan I shape,[1] and a "negative" painted vase, the decoration (for which the term *resist painting* seems preferable) consisting of a row of large round dots on a dark band encircling the lower wall. This burial mound had a rough masonry core, above which were five successive floors of lime plaster. If any stone or plaster facing had once existed no traces remained. This mound dates from the close of the Middle Cultures, Linné equating it with Cuicuilco-Ticoman.

The Chalchicomula area was chosen in the hope that close connections with classic Teotihuacan (Periods II and III) would be found, particularly evidence for the source of Thin Orange pottery. Instead, the scarcity of such materials leads Linné to doubt that the Carrasco collection in Berlin, which contains typical Teotihuacan pottery, can actually be from Aljojuca, as had been reported. The problem of Thin Orange pottery is thus little advanced, except to clear away existing misconceptions. This section of the report (Part I) also includes notes and illustrations of purchased specimens from Santa Cecelia Tepetitlan, not far from Aljojuca.

Part II reports work at a number of places in Tlaxcala, in the vicinity of Calpulalpan. Besides some important locally owned collections, either purchased or studied, brief excavation was carried on at a group of mounds near Las Colinas. A small group of buildings and a small platform were cleared, and two graves containing, *inter alia*, several Thin Orange vessels, served to identify this as a "daughter city" of Teotihuacan, belonging to Period III. Linné also notes important resemblances to Monte Alban III, particularly in a magnificent bowl with human and animal figures in relief. In discussing a double vessel with a tube connecting the halves, which was found at Las Colinas, Linné reviews the distribution of double and whistling vessels in the New World.

Part III contains an account of the important work at Teotihuacan. At Tlamimilolpa, a "suburb" 200 m. east of the church of San Francisco Mazapan, Linné cleared 176 rooms, 4 or 5 courtyards and numerous passages in a complex estimated to have over 300 rooms. The rooms are closely packed, the alleys between forming a great labyrinth, and only a few groups of rooms open onto small courts, containing catch-basins from which underground drains carried away the accumulated rain water. Various details of "this from every point of view misbegotten architectonic creation" are discussed, such as walled-up rooms (probably for storage), wall paintings, the complex system of stone basins and drains, methods of constructing floor and walls, and evidence concerning roofs. A number of minor points could have been elucidated more clearly with the addition of more drawings of architectural details. Kitchens and fireplaces are conspicuously lacking in the rooms cleared, but Linné concludes that this ruin "shows how people of the better classes were housed." Digging to sterile soil below several rooms revealed that the original floors and walls had twice been raised, following closely the original plan. No great differences were noted in the sherds sealed below successive floors, although no detailed counts are presented by which this opinion could be checked. Thus there is indicated a relatively short occupation, compared to the history of Teotihuacan as a whole. The "Spartan simplicity" and the "utilitarian character" of this settlement contrast with the elaborate religious architecture of other parts of the site. It is a pity that the time available was too limited for the expedition to trace the whole of this complex of houses, as it contributes an exceedingly interesting domestic parallel to the more extensively studied ritual areas of the site.

Below the floors of these rooms at Tlamimilolpa thirteen graves and three caches were found, all contemporary with the settlement. Grave 13 (p. 139, Figs. 274–85) had been opened by a local farmer, however, just prior to Linné's arrival, and a Fine Orange vase that was said to come from it is certainly a plant, as Linné himself suspected (p. 178) but does not definitely state. Otherwise, the grave furnishings are of Classic Teotihuacan type, including slab-footed cylinder tripods, *floreros*, *comales*, *incensarios* with finely modelled and painted human faces, and many small objects of stone, bone, and shell. Burial 1 contained about 1,200 artifacts, which had been closely packed around the skeleton and burned with it in intense heat. The resulting cremation of the body may have been incidental to the destruction of the offerings, as no attempt had been made to collect the fragments of bone and deposit them in an urn or jar. In this respect Burial 1 differs from the cremations made in Mesoamerica in the centuries immediately preceding the Spanish conquest. Elisabeth Strömberg con-

[1] Pedro Armillas, "Exploraciones recientes en Teotihuacan, Mexico," *Cuadernos Americanos*, Año 3, No. 4, pp. 121–36, Mexico, 1944. Cf. Pl. 1, Fig. 3.

tributes a short analysis of charred textile fragments from this grave, indicating that a loosely woven cloth of agave fiber was made in Classic Teotihuacan times, and also very fine and closely woven cotton cloth in both plain and patterned weaves. Fragments of coiled basketry and bark paper were also preserved.

Linné believes that the Tlamimilolpa settlement and graves are slightly later than those of Xololpan (p. 186), chiefly on the basis of architectural similarities between the first stage of construction at Tlamimilolpa and the Xolalpan site. Armillas follows Linné on this relationship, and in his chronological outline of Teotihuacan places Tlamimilolpa between Period III and Period IV.[2] Subsequently, Kidder, Jennings, and Shook have reviewed and synthesized the studies of Vaillant, Armillas, Noguera, and Linné at Teotihuacan. They point out that the "nubbin" feet on many of the Tlamimilolpa bowls and cylindrical vases are characteristic of Teotihuacan II, according to Armillas, and would therefore suggest that Tlamimilolpa was "slightly older" than Xolalpan.[3] It might then be placed intermediate between Period II and Period III. If Xolalpan and its associated artifacts are generally accepted as diagnostic criteria for Period III, I would favor this assignment of Tlamimilolpa. It is obvious, however, that the precise chronological relationships of various parts of the site deserve further study, elaborating the excellent preliminary outline by Armillas, to which reference has been made, and making available such unpublished materials as those of Vaillant and Saenz.

Such is the importance of Teotihuacan and its wealth of archaeological data that the minutiae of its chronology and material culture are worthy of the painstaking attention which Linné gives them in this report. Part IV summarizes in excellent fashion the origins and nature of the Teotihuacan culture. He agrees with Noguera that "a wide gap exists between Teotihuacan I and the epoch next following it, Teotihuacan II" (p. 183), and states that a consistent course of development marks Periods II, III, and IV. Attention is given to the arts and crafts of the Classical Teotihuacan culture (Periods II and III), and its social and religious organization so far as they can be surmised. Linné also considers the relation of Teotihuacan to broad currents of cultural history in Mesoamerica, especially the evidence for contact with the highlands of Guatemala, the lowland Maya area, and Oaxaca, and finally he comments on the place of the Pipil and the Toltecs in Mesoamerican history.

Despite points on which descriptions are tantalizingly brief, Linné has made available a wealth of data on one of the New World's most significant archaeological sites, and illuminated them with his searching and thoughtful comments and interpretations. This report is a "must" for all who are interested in America's high cultures.

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[2] *Ibid.*, p. 132.

[3] Alfred V. Kidder, Jesse D. Jennings, and Edwin M. Shook, "Excavations at Kaminaljuyu, Guatemala," *Publication, Carnegie Institution of Washington*, No. 561, Washington, 1946, pp. 251–4.

A Manual of Archaeological Field Methods. ROBERT F. HEIZER, Editor. Millbrae, California: The National Press, 1949. vi+72 pp., 2 maps, 12 figs.

The editor cautions that "this work has been written with the Central California area in mind and that it is directed toward beginning students in archaeology." The manual is a spare time project of a group of graduate and major undergraduate students in the Department of Anthropology of the University of California at Berkeley and of A. E. Treganza (San Francisco State College), Franklin Fenenga and F. Riddell (California Archaeological Survey), and R. F. Heizer (University of California at Berkeley). Students in other areas will find that much of the material presented applies equally well to their problems. The reviewer received a general impression of sensible, competent exposition of the fundamental techniques of field archaeology. Text and bibliography indicate that the California group are fully aware of developments in other areas and of the necessity for maintaining a flexible approach to the varied situations encountered in field work. Unfortunately, the manual cannot be recommended unreservedly as an introduction, chiefly because of weakness in the section on topographic mapping. This defect and a few minor errors and omissions can be easily remedied in subsequent editions.

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Archaeological Notes on Posey County, Indiana. WILLIAM R. ADAMS. Indianapolis: Indiana Historical Bureau, 1949. 81 pp., xvi pls., 5 maps.

It has been known for some time that the southwestern pocket of Indiana was unusually rich in archaeological remains from both the qualitative and quantitative standpoint. Hints of this have been in the recent literature, including three accounts by Glenn A. Black which are not included in the bibliographical references of the report under review. At least, I did not find them, and the Indiana Historical Bureau has a curious aversion to a terminal bibliography. This report deals with a portion of the aboriginal remains from Posey County and is based upon the earlier literature, a study of various previous collections, and the material obtained from a surface survey of part of four out of ten townships in the county. Apparently, restrictions of time and funds prevented preliminary excavations in several sites which would have given important information on cultural succession and association.

There is a brief introduction, a section on the natural environment, and an historical sketch. Nineteen village sites and 12 mounds are listed. The bulk of the paper describes the Bone Bank site, from which little material is now available, the Murphy site ("Mouth of the Wabash River Site"), and the Mann site. The Murphy site may be regarded as an unusual type of Middle Mississippi *for this area*. In my opinion, there is no question of this site being a part of Upper Mississippi, for it is very close to materials in northeast Arkansas-southeast Missouri, which is the heart of the "original" Middle Mississippi. Black has long leaned

toward an Upper Mississippi allocation for the site and this opinion is mirrored in Adams' hesitation in recognizing its clear affiliation. There is also, it might be observed, no reason for associating Bone Bank or Merom with the Oneota culture. Certainly, "the Murphy Site should, therefore, be seriously considered as a site worthy of re-examination."

The Mann site is another "key" site in the area, for the cultural inventory clearly indicates it to have been very important within the Hopewellian period because of its connections to the Swift Creek area, to the Lower Mississippi Valley, and to the major Hopewell centers in the north. Perhaps the outstanding artifact reported from the site is an unusual cat effigy, which is now in the Brooklyn Museum. Adams, I think, has placed too much emphasis on what he considers as Marksville influence at the site.

As a whole this report indicates aboriginal occupation of the area from the Archaic to about the historic period. Further survey in this and adjacent counties plus stratigraphic pits in some of the sites with mixed surface collections would be of considerable value.

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An Archaeological Survey of the Trent Waterways in Ontario, Canada and Its Significance for New York State Prehistory. WILLIAM A. RITCHIE. Researches and Transactions of the New York State Archaeological Association; Lewis H. Morgan Chapter, Vol. XII, No. 1. Rochester, 1949. iv, 52 pp.

As one would expect it to be, the report of Dr. Ritchie on two sites in the Trent Waterway area of the Province of Ontario is outstanding and provocative. The first site described, on East Sugar Island, is situated in Rice Lake, a small inland lake ten miles north of eastern Lake Ontario on the route believed by historians to be the Iroquois Trail, used by those Indians in their attacks on the Hurons and over which Champlain traveled in 1615.

Sugar Island site was proven, by examination of artifacts and especially pottery, to be a site of a type not unknown in Ontario but extremely rare. The specimens of the upper stratum in many respects were similar to those of the Uren site in Oxford County, north of Lake Erie, as described by Wintemberg in 1928, and to those of the Crawford site on Lake Huron examined by myself in 1948. Other evidences of pre-Iroquoian traditions have come to light in various parts of western and central Ontario, but no satisfactory comparative analysis or correlation has been achieved. Wintemberg designated the Uren site as proto-Neutral.

Dr. Ritchie brought to his work in Ontario a wide experience in the neighboring territory of New York State, enabling him to correlate the finds from the four stratas in the Sugar Island site with the New York Woodland sequences, and to interpret the composite traditions that were indicated in terms of cultural development.

With the excavation, Ritiche has satisfied himself that the hypothesis has been strongly confirmed that a Canadian Point Peninsula complex existed, essentially the equivalent of New York Middle Point Peninsula. The result also allows for a new perception of the geographic spread of the proto-Iroquoian infiltration in northeastern America.

Once again it has been proven that science knows no international boundaries. Canadian archaeologists are grateful to Dr. Ritchie for this basic contribution to the study of our native aborigines. His report should give impetus to a more extensive research in the relating of our sites to specific complexes.

The second site examined and reported by Ritchie was located near the town of Picton in Prince Edward County, a peninsula in Lake Ontario at the mouth of the Trent River. The site in reality is a burial mound containing eleven burials of four types, cremation, flexed inhumation, bundle burial, and extended burial. In all cases the remains had been treated with powdered hematite. Mortuary offerings consisted chiefly of personal ornaments fashioned from native copper and marine shell.

No similar site has been scientifically exposed to date, and therefore a detailed description of each burial and its artifacts is given. Dr. Ritchie then classifies the site as an early horizon of the Woodland period, more specifically of the Glacial Kame culture, little known as this tradition is. In sequence the Picton site parallels the Sugar Island earliest level. Red Paint burials have been recorded from time to time in Ontario as noted by Ritchie. No definition of them has been made however, other than Wintemberg's surmise that they may have been of Hopewellian origin. This Ritchie has quite rightly disputed. I am reminded of a burial pit in Lobo Township, near London, Ontario, where the skeleton of a man, approximately 45 years of age, was discovered some years ago in a grave 4 feet in diameter, lined with 2 inches of red clay. At the time, Wintemberg and I concluded that it was definitely a pre-Neutral feature of an unknown tradition. No artifacts were found in this instance.

Dr. Ritchie's report is well documented with ample notes and references, profiles, and photographic illustrations. The description of artifacts is masterly. A ceramic analysis of the Sugar Island site is offered, and most interesting is the chart of suggested temporal and cultural relationship of certain Ontario and New York sites. The interrelationship of four cultural units, Lamoka, Adena, Hopewellian, and Woodland, is indicated as well as the sequence of known horizons in southern Ontario and northern, central, and western New York. The scarcity of evidence in the Ontario sequence is all too obvious. At present few conclusions are in order concerning it.

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Arqueología agustiniana. JOSÉ PÉREZ DE BARRADAS. Bogotá, Colombia, 1943. 169 pp., 179 figs., 189 pls.

Dr. José Pérez de Barradas, Spanish archaeologist, excavated from March to December of 1937 in the region of San Agustín, near the headwaters of the Magdalena River in Colombia. His report, although published in 1943, has only recently been distributed to interested scholars in this

country. It is clearly the most significant contribution to our archaeological knowledge of San Agustín since Preuss published his great work in 1929.[1] The author gives the present location of many of the statues described by Preuss, illustrates 82 statues and reliefs which Preuss found but did not illustrate, and describes 48 newly discovered statues and reliefs. This brings the known total of San Agustín stone carvings to over 300 pieces. The author also discovered and cleared the elaborately carved stream bed at Lavapatas, which he describes and illustrates in detail in this report.

The volume is, then, a contribution to the study of stone carving and architecture. However, it also has the distinction of presenting the first detailed account of the ceramics found in the San Agustín excavations. Both grave and habitation materials were obtained. These present a variety of styles and raise problems which are emphasized in the present review.

Preuss had encountered habitation sherds and some grave pottery in his excavations at San Agustín, but these formed only a minor part of his report. However, in a refuse layer at Matanzas he did isolate one ceramic complex which differed from the styles found elsewhere in San Agustín sites. The complex contained plain ware sherds from open bowls, some with coil marks still visible but none with incised designs. Instead, the decorated pieces were painted in red on a whitish-yellow background, with simple designs composed of parallel lines, chevrons, and triangles. Open bowls were the most characteristic but there were also two bulbous tripod legs. Among the artifacts were fragments of clay figurines, both seated and standing, some plain and some painted in the red-on-yellowish style. Stone pestles, grindstones, and axes completed the finds. A complete bowl with a relief snake design came from the same area, but was not clearly associated. Preuss was impressed by the distinctiveness of this Matanzas complex.

Pérez de Barradas did most of his excavating in the three areas called "Mesitas," where the most elaborate manifestations of the classic San Agustín temple mounds and stone carvings are found. However, he excavated graves in several other regions. Three of these cemeteries contained distinctive ceramic complexes, which are briefly summarized here.

At Alto de Lavapatas, seven graves were encountered, all of the shaft and chamber type. The oval shafts were about two meters in depth. An upright stone slab closed the entrance to the side chamber. The ceramic accompaniment was small, only sixteen vessels, but all are of a consistent style. Convex-sided, rimless bowls are the most typical and shouldered vessels with simple flare rims are also common. The remaining types are but minor variants on the above two. Simple incision is the only decorative device, but appears on half of the vessels. The designs are combinations of parallel lines arranged in zigzag or chevron patterns. On two vessels, the incised lines have a white fill. Pieces of a wooden sarcophagus were found in one grave.

At Quebradillas, the author excavated ten graves and describes eight others which local residents had recently opened. Again, the graves are of the shaft and chamber type but with a round shaft. There is no slab door; instead a layer of stones is found in the shaft just above the entrance to the chamber. Forty vessels were found in these graves, and again present a distinctive complex. The vessel shapes are more varied than in the Lavapatas group. The olla collars may be cambered or bulging. Rims have thickened edges or fold over externally. True collar jars and pedestal bowls are found. Only four of the vessels have incised or punch decoration. Other types of decoration are also limited, and include thumb impressions around the rim, rim nubbins, black-on-white negative painting, and positive painting of dark red bands on a lighter red base and of black lines on a white base.

Nine graves were excavated at El Guineo. All were stone lined and covered box types. A typical box is 170 centimeters long, 46 wide, and 32 high, with the covering stone 78 centimeters below the surface. Again, the ceramic accompaniment was small, only seven vessels, but these were quite distinctive. The shapes are open bowls with flaring or carinated rims; squat bowls with annular bases not tall enough to be classified as pedestals; an unusual double-type vessel; and a globular jar with a double spout and connecting bridge of Quimbaya type. The double-spout vessel is painted in a black-on-red design, which appears to be negative, but is not so identified by the author. However, another vessel is stated to have a black-on-red negative design. Incision is not found as a decorative technique. The double-type bowl has a red painted band on a light yellowish clay.

In his excavations at the "Mesitas" it is interesting to note that aside from stone chamber graves, some of which contained stone sarcophaguses, Pérez de Barradas encountered stone-lined boxes, shaft and chamber burials, and direct pit graves. The contents of these graves was meager, but some idea can be formed by combining the work of Preuss and Pérez de Barradas. There are both tall and squat pedestal jars, collar jars, plates, deep bowls with flaring and fold-over rims, ollas with bulging collars, angular bodied bowls with cambered rims, and deep cups. Decoration types include appliqué strips and knobs, incision, punch with white fill, and rim nubbins, plain and modeled. All this seems closest to the Quebradillas complex.

Sherds were common in the trenches, and in the second trench at the northwest mound of Mesita B a stratified sequence was found. Here an upper layer of black, earth, starting about 80 centimeters below the surface, was superimposed on a lower level of black earth, which contained quite a mixture of sherds as well as evidence of older stone buildings. The two sherd-bearing black-earth strata were separated by yellow clay. The sherds from these two levels presented different styles, some of which were encountered in other excavations at the Mesitas.

The lower level contained a clear Matanzas component: fragments of open bowls, painted in red, brown or black on a yellowish or reddish base in designs of parallel lines, diagonals, and chevrons; mammiform tripod legs; a figurine head; and fragments of bowls with relief snake designs. However, the lower level also contained sherds representing other styles. There were sherds from rimless open bowls

[1] K. Th. Preuss, *Monumentale Vorgeschichtliche Kunst*, 2 vols., Gottingen, 1929.

and cups, simple flare rim bowls, and angular bodied bowls, all with both fine and coarse incised designs plus some punch. There were also pedestal cups, tripod bowls with tall legs, and fragments of double spout and bridge vessels. Special decorative techniques included bright vermillion slip, black and white negative painting, and modeled serpent-head adornos. In summary, this lower level presents a mixture of the base elements of the Matanzas, Lavapatas, and El Guineo complexes.

The upper level contained large numbers of plain sherds, usually rather coarse in composition. The rim fragments show a wide range of types. The decorated sherds have coarse and fine incision, incised lines filled with white paste, finger-pressed rims, appliqué strips, appliqué knobs, and rare red-on-white positive painting.

These excavations by Pérez de Barradas demonstrate that the ceramic situation in the San Agustín region is complex and difficult to interpret. One suggestion is that three isolated complexes, Matanzas, Lavapatas, and El Guineo, are in part contemporaneous, as demonstrated by the mixture in the lower level at Mesita B, while the fourth, Quebradillas, represents a later development in which the distinctiveness of the three earlier components is largely lost, as confirmed by the upper level at Mesita B.

Another suggestion is that the Matanzas complex represents an earlier culture which persisted up to classic San Agustín times and then disappeared. (Whether it is actually earlier is unconfirmed stratigraphically, but at least the post-San Agustín position once postulated by the reviewer[2] is no longer tenable.) The El Guineo complex could represent an intrusion from some other region, such as the Cauca Valley. Its Quimbaya affiliations seem clear and imply certain antiquity for that distinctive culture. If Matanzas is considered earlier, the implication follows that the dominant San Agustín component, represented in the lower stratigraphic level at Mesita B and isolated in the upper level there and at Quebradillas, had its origin elsewhere. However, this leads to speculation unwarranted by present evidence.

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[2] Wendell C. Bennett, "Archaeological Region of Colombia: A Ceramic Survey," *Yale University Publications in Anthropology*, No. 30, New Haven, 1944.

NOTES AND NEWS

NORTHERN MISSISSIPPI VALLEY

In 1950 the Carnegie Museum, Pittsburgh, is initiating a long-term program of anthropological research the purpose of which is a definitive study of the Indians of the upper Ohio river drainage, particularly their pre-literate history The geographic area concerned extends from southwestern New York to West Virginia and includes all of western Pennsylvania.

An appropriation has been secured for an initial three-year survey. This first project is designed to delineate the available cultures and to ascertain localities which will best repay intensive study. The survey will be intensive in nature, making use of surface collections as well as limited excavation at selected sites. Previous research in the area will be reviewed, compiled, and systematized. Co-operation of all interested institutions and individuals will be actively invited. It is expected that at the end of three years a skeletal history of the region will have been produced and the basic data made available in systematic form.

Archaeological knowledge of the adjacent New York and Ohio areas is more complete than in western Pennsylvania. Chief value of the Carnegie Museum program will thus be the closing of a gap in eastern United States prehistory. The program is under the general direction of James L. Swauger, Curator, Section of Man, Carnegie Museum. The field work will be carried out by a small staff under the direction of William J. Mayer-Oakes, Archaeologist, Carnegie Museum.

NORTHEAST

During the first half of August, a field party from the Royal Ontario Museum of Archaeology, at Toronto, under the direction of Kenneth E. Kidd, explored a Late Woodland site on the Krieger farm, three miles east of Chatham on the south side of the Thames River. A considerable quantity of pottery, together with a small number of bone tools and a few stone artifacts, were recovered.

Some of the pottery previously found on this site, was shown to the writer by Mr. Kidd and certain of its inherent characteristics, principally incised ornamentation, strongly suggest its inclusion in the theoretical Late Woodland lineage of Iroquois.

Mr. Frank Ridley of Islington, Ontario, has reported his discovery of a historic period Nipissing site covering about one and one-half acres, located on the south shore of Lake Nipissing. From the upper level of a layer of black soil he removed French relics, pot and pipe sherds, and other articles, while the deeper deposit produced quartz chips. Further work on the site is planned.

According to Dr. Douglas Leechman, of the National Museum of Canada, "Thomas E. Lee conducted a survey of archaeological sites along the north shore of Lake Erie where eighty-eight sites were found, of which at least fourteen were non-ceramic. About 6,500 artifacts and sherds were collected and about 30 burials were recorded. Collections made by local amateurs were studied and, when advisable, were photographed. Laboratory work on this material is now under way."

For a period of two weeks, a party from the Rochester Museum of Arts and Sciences, led by Dr. William A. Ritchie, continued the work of the previous year in southern Ontario, under a grant from the American Philosophical Society. The specific problem of 1949 was the determination, if possible, of the relationship of certain mounds on Massasauga Point, Bay of Quinte, to the Middle Woodland period, Point Peninsula culture, investigated at Rice Lake

in 1948. Two mounds were completely trenched and another sampled. The latter proved not to be a burial structure but to have many constructional features in common with the Perch Lake mounds of northern New York. One of the two burial mounds was found to have previously been opened and the skeleton in large part removed. The second mound, in which a child burial had been found by us in 1948, yielded an undisturbed flexed adult skeleton under heavy rock slabs close to the base line. In intimate association with both of the burials in this mound were found small potsherds, evidently not grave goods, clearly of Vinette 2 ware and similar to many obtained in the East Sugar Island, Rice Lake stratified middens. This fact suggests that the use of burial mounds (and perhaps mounds of another type as well) was part of the cultural pattern of the Point Peninsula group which introduced Vinette 2 ware into the northeast from Ontario; and, further, that the Rice Lake mounds may intrinsically be related to the middens (see Ritchie, "An Archaeological Survey of the Trent Waterway in Ontario, Canada . . . ," *Researches and Transactions of the New York State Archaeological Association*, Vol. 12 No. 1, 1949).

From mid-July until the end of August, the party under Dr. Ritchie's direction, which consisted of Gordon K. Wright, Peter P. Pratt, and the following special assistants of the State Museum: Donald Lenig, P. Schuyler Miller, and Alfred K. Guthe, worked in eastern New York on the problem of the relationship of late Owasco to the early Mohawk cultures, the Rochester Museum and the New York State Museum jointly sponsoring this phase of the summer's endeavors.

A small early Mohawk site (Chance site) was explored in the Schoharie Valley. While the pottery found was definitely Mohawk in type (Chance Incised predominantly), the chipped stone inventory was typically Owasco. Search for a late Owasco station in this area proved fruitless, but some excavation was done in an early station of this culture, located near the village of Schoharie.

The major contribution to the problem was made on the Snell site, at West St. Johnsville, in the Mohawk valley. Here some 60 pits and 5 burials were opened and a considerable body of data was secured. Although this large village component did not pertain to the later or Castle Creek Focus of the Owasco aspect, a majority of the abundant pottery (including several restorable pots) exhibited a marked departure from the traditional corded-stick Owasco decorative technique, the design motifs (of Owasco character) being executed in an interrupted incised linear technique. Incising, but not interrupted linear (push-and-pull) work, was the method employed by the Mohawk potter, and we have here the earliest known potential local source of the technique in the Mohawk Valley.

The first half of September was devoted by Dr. Ritchie, then a member of the scientific staff of the State Museum, to the further exploration of an area of the Vinette site at Brewerton on the Oneida River, made available by the removal of a house. With the part-time volunteer assistance of Charles A. Denman, Vincent J. Schaefer, and Charles F. Wray, a trench was opened which served to confirm Ritchie's earlier excavations at this important stratified Archaic, Early, and Middle Woodland period site.

Dr. Maurice Robbins reports that "the Warren King Moorehead Chapter of the Massachusetts Archaeological Society has continued its work at the Titicut site in Bridgewater during the season just passed. A new feature, discovered this year, was the presence of deposits of charcoal and 'red paint.' In one of these deposits a crescent-shaped object of ground slate (12½ cm. by 4 cm.) and a plummet were found buried in 'red paint.' Other similar deposits contained no implements. These deposits were located at a depth of from 65 to 80 cm., below or at the base of a deposit of gravel, near the base of the esker which bounds the site on the west. Excavation will probably be continued in this area next year to determine the extent of this type of deposit. Joseph Hartschorn, a student of Dr. Bryan, has been engaged all summer in an extensive geological survey in the quadrangle in which the Titicut site is located. His purpose is to discover if possible the relations between soil horizons and culture horizons at Titicut.

"During the summer of 1949," states Mr. Fowler, "research was conducted by William S. Fowler, Curator of the Attleboro Museum, on two sites in central New England. At Potter Pond, South County, Rhode Island, he assisted the Narragansett Archaeological Society of Rhode Island in completing the excavation of a shore site with a heavy overburden of shell middens. The site is important because it displays stratification with two apparently pure culture horizons well defined, viz., preceramic with a profusion of steatite bowl sherds and some finishing tools for steatite working, and ceramic-agricultural. This habitation site has culture manifestations that equate closely with those at Ragged Mountain, a rock-shelter-steatite quarry site in Connecticut, excavated in 1948 by the Peabody Museum of Yale University, with final report now in process. At these two stations, stratified evidence seems sufficient to justify a chronological position for the steatite bowl industry directly antedating that of ceramics. Of additional significance are culture transitional manifestations between the two periods at Potter Pond that strongly imply genetic continuity. Furthermore, it is worth noting that the ulu, plummet, ground slate, and grooveless stemmed gouge are negative traits at both sites in the steatite horizon, which underlies the ceramic.

"At Nunkatuset site, in the Taunton River Basin of Massachusetts, further research revealed evidence of at least three culture horizons clearly defined by stratigraphy. Here have appeared not only evidence of the steatite and ceramic occupations but also an earlier preceramic one underlying the steatite and containing the ulu, plummet, ground slate, and grooveless stemmed gouge traits. When taken together, these sites seem to contribute evidence toward the more effective delineation of culture traditions in central New England."

John Witthoft of the Pennsylvania Historical and Museum Commission, states that "most of the summer season was spent in the excavation of the Eschelman site, which is a part of the Washingtonboro village site reported on by Cadzow. This particular area is about 300 yards west of the Keller site which he dug, and about 200 yards south of the Heast Frey site. It is a part of the same settlement. What

we dug was a dump in a gulley along with adjacent areas filled with postholes and cache pits, but with no burials. The pottery is entirely Schultz Incised with the exception of a few trade sherds and a couple of sherds of the historical phase of Shenk's Ferry, that is, Funck Incised. Although the site is later than the Schultz site, it still shows a preponderance of native material and a complete absence of gun parts. I hope that the material from this location will give us the main leads by which we can interpret the sites which Cadzow dug in 1931–32."

A new center of archaeological activity has recently been developing in western Pennsylvania according to James L. Swauger of the Carnegie Museum, who reports as follows: "Locally we have been preparing for extended activities beginning in 1950 by gathering and reading all literature available on the upper Ohio area and by making short survey trips here and there in order to determine what localities would best reward serious effort next year. Incidentally we have succeeded little in turning up anything of worth but have managed to dissipate five local legends concerning 'burial mounds' and habitation sites, and in contacting local collectors and interested persons in order to inform them of our hopes for the future and to gain from them pertinent information. Mr. David Rial and I visited the University of Nebraska's dig in Frontier County under the aegis of E. Mott Davis. We learned a great deal. Tangibly, the summer's results have been meagre; considered as preparatory work, they bulk rather large in our horizon."

Acting under a grant from the Indiana Historical Society, Edmund S. Carpenter took a party of University of Pennsylvania and University of Toronto graduate students into the field from June 1 until September 1, consisting of Messrs. Douglas Bell, Gerald Pawlowski, Frederick Taylor, Sherman Redeye, and Henry Michael. Surveys were made of the Allegheny, Monongahela, Potomac, Shenandoah, and James valleys as a continuation of the Delaware project begun some years ago. Three mounds and six village sites were explored. Final reports are now being prepared for publication.

Ralph Solecki of the Bureau of American Ethnology, who has been conducting extensive river basin surveys in West Virginia, sends news of the formation of a new archaeological group in that state. "The West Virginia Archaeological Society, Inc., organized during the early part of 1948, had its first official meeting at Charleston, West Virginia on October 8, 1949. With the formation of this group, comprising some 40 members, we have at long last active interest in West Virginia archaeology. Mr. Joseph H. Essington, President, and Mr. Delf Norona, Secretary-Treasurer, are responsible for the incorporation of the society at Moundsville, West Virginia. A small nucleus of interested members of this group are at work studying the archaeology of the state, and a museum is under construction at Moundsville, next to the Grave Creek Mound. The first issue of the society's organ, *The West Virginia Archaeologist*, was published in April, 1949. There is great promise of more archaeological data to appear in print from this newcomer."

The fourth annual student excavation sponsored by Professor T. F. McIlwraith, head of the Department of Anthropology of the University of Toronto, journeyed to a prehistoric Iroquois village at Woodbridge, Cntario. The three day excavation was under the field direction of Mr. J. N. Emerson, lecturer in Anthropology, and a trained group of archaeological-administrative student personnel. The 200 students were basically from freshman classes. 12,500 square feet of the site were excavated, bringing to light the remains of sixteen long-house structures. The main feature excavated was a single unit long-house 28 feet by 170 feet with four central hearths. It was oriented north-south and had southern and eastern entrances. The delineation of cubicle structures is yet to be done. It is hoped that considerable information on village plan and population density will be derived from analysis of the collected data. This year's work will be combincd with information gleaned from a similar student excavation carried out in 1947, where the digging was concentrated upon refuse deposits.

During the summer of 1949 archaeological work was carried on in the Union River Valley, Ellsworth, Maine, under the joint sponsorship of the Robert S. Peabody Foundation, Phillips Academy, Andover, Massachusetts and the Robert Abbe Museum, Bar Harbor, Maine. The work this summer was under the direction of Douglas S. Byers and Wendell S. Hadlock. The excavations carried on during the months of July and August were on the eastern bank of the Union River on the property of Russell Smith. Here further evidence supporting previous excavations at Wasp Island in the Union River was secured regarding the sequence of cultural development for this area. Here, as at Wasp Island, was uncovered evidence of people using polished stone tools as well as certain chipped forms on the lowest occupational levels. The middle and upper horizons contained pottery, stone material and chipped stone implements similar to other archaeological sites previously reported in Maine. Thus, the site, although partially excavated, appears to indicate progressive development of the early inhabitants of Union River from a period of respectable antiquity down to historic times.

During the greater part of the excavation the party included the directors, Douglas S. Byers and Wendell S. Hadlock; Jean Hayes, Radcliffe College; Edward Rogers, Middlebury College; Roger Bradley, Dartmouth College; and Stephen Phillips of Salem. During the last two weeks of the excavation ten students from Willamantic State Teachers College assisted under the direction of Mrs. Eva Butler.

The University of Michigan continued work on three raised beach sites near Killarney, Ontario, with nine students from Columbia University, University of Michigan, and University of Toronto. A stone mound was also examined, but like all stone mounds so far found in that area it had been examined before and converted into a fireplace. One of the chief results of the summer's work was the finding of a burial at the Killarney Bay 1 site with a considerable number of copper implements and two large flint blades.

At the meeting of the Michigan Historical Society in October, a small number of interested people discussed the possibility of forming a Michigan archaeological society. The matter will be decided upon at a future meeting of that Society, or at the Spring meeting of the Michigan Academy of Science, Arts, and Letters. (*W.A.R.*)

MIDDLE AMERICA

One of Mexico's most distinguished educators and scholars, Dr. Alfredo Barrera Vasquez, will teach next year at Tulane University as visiting associate professor of Anthropology. Dr. Barrera is director of the Institute for Indian Literacy of Mexico, and is a leading authority on the linguistics and history of the ancient Mayas. He has held Guggenheim, Rockefeller, and Carnegie grants for research on the Maya, and has written several books in the field.

At Tulane he will give an advanced course in Middle American anthropology, will take part in a Middle American seminar for students in Latin American studies, and will do research in the collections of documents in Tulane's Middle American Research Institute. Dr. Barrera's wife, Señora Sylvia Rendon de Barrera, who is herself an authority in certain fields of Mexican anthropology, will accompany him to Tulane. A monograph on Mexican pottery written by Señora de Barrera will be published next year by the Tulane Middle American Research Institute.

In 1943 the Guatemalan government made it possible for the Museo Nacional de Arqueología e Historia, recently changed to the Museo Nacional de Arqueología y Etnología, to be moved from the old "Aurora Park" building to a larger, well-lighted, and well-equipped building on the old fair grounds. Under the able guidance of the newly-elected director of the museum, Don Antonio Tejeda, and the director of the Instituto Indigenista, Don Antonio Gouboud, the beautiful material of the Mayan area has been displayed in artistic and scientifically instructive exhibitions. Great help in this project was given by the Instituto de Antropología e Historia, founded in 1946 and under the active leadership of Lic. Hugo Cerezo. This change in the location of the museum was initiated by the Carnegie Institution of Washington, which invited Dr. Paul Nesbitt to come to Guatemala to supervise the activities and applied for an aid from the Rockefeller Foundation to sponsor his work. The advisory council consisted of Dr. A. V. Kidder, Chairman of the Division of Historical Research of the Carnegie Institution of Washington, and Robert Eliot Smith, representative of the Carnegie Institution of Washington and head of the archaeological section of the Instituto de Antropología e Historia.

The exhibition rooms and the newly established research library are now in working order. The scientific activities in archaeology and ethnology, both in the museum and in the Maya area, are recorded in the new *Guide Book to the Museum* and in the bi-annual publication of the Instituto de Antropología e Historia.

The organization and classification of the study material has been entrusted to Dr. S. F. Borhegyi, former assistant curator of the Hungarian National Museum. This work was made possible by a Viking Fund grant-in-aid and is being directed by the Carnegie Institution of Washington. The *bodega* project will be completed by June, 1950, at which time it will be made available to students of Mayan archaeology. The highly valuable material from the excavations at Uaxactun, Zacualpa, Kaminaljuyu, San Augustín Acasaguaztlan, Nebaj, and other minor sites, as well as the magnificent Dieseldorff collection, is being arranged according to chronological sequence. The pottery will be divided into shapes, wares, design elements, and stratigraphic horizons. A new system of "pictorial" labeling is being employed in the hope that it will greatly facilitate the research work of the future students. In addition to this, maps, cross sections of the excavations, charts, and a complete cross-reference index, both in Spanish and in English, will quickly locate any desired material. The collection of *desconocido* material will also be arranged in the same manner in hope that future study and work will throw some light on their provenience and origin.

The museum is in great hope that the well-arranged *bodega*, the laboratories, and the newly established archaeological courses, will attract students who desire to increase their knowledge of Mayan archaeology. (*Stephen F. Borghegyi.*)

INTERNATIONAL DIRECTORY OF ANTHROPOLOGISTS

An announcement has been received of the publication of the *International Directory of Anthropologists*, Third Edition, prepared under the auspices of the Committee on International Relations in Anthropology of the American Anthropological Association and the Division of Anthropology and Psychology, National Research Council. The price is $3.00, and orders for copies not already subscribed for should be addressed to: The Secretary, Division of Anthropology and Psychology, National Research Council, 2101 Constitution Ave., Washington, D. C.

SOME RECENT PUBLICATIONS

The following abbreviations appear in the list which follows:

AA	*American Anthropologist*, n. s. Menasha.
AcAm	*Acta Americana*. Los Angeles.
AHG	*Antropología e Historia de Guatemala*. Guatemala.
AJA	*American Journal of Archaeology*. Menasha.
AMNH-AP	*American Museum of Natural History, Anthropological Papers*. New York.
APS-P	*American Philosophical Society, Proceedings*. Philadelphia.
AQ	*The Art Quarterly*. New York.
Ar	*Archeology*. Cambridge, Mass.
AR	*Anthropological Records*. Berkeley: University of California.
ASD-B	*Archaeological Society of Delaware, Bulletin*. Wilmington.
ASNJ-NL	*Archaeological Society of New Jersey, News Letter*. Trenton.
ASV-QB	*Archeological Society of Virginia, Quarterly Bulletin*. Richmond.
BA	*Boletín de Arqueología*. Bogotá.
BBAA	*Boletín Bibliográfico de Antropología Americana*. Mexico City.
CAS-R	*California Archaeological Survey, Reports*. Berkeley.
CIS-NL	*Cranbrook Institute of Science, News Letter*. Bloomfield Hills, Michigan.
CIW-CAAH	*Carnegie Institution of Washington, Contributions to American Anthropology and History*. Washington.
CIW-NMAAE	*Carnegie Institution of Washington, Notes on Middle American Archaeology and Ethnology*. Washington.
CIW-P	*Carnegie Institution of Washington, Publications*. Washington.
CNHM-B	*Chicago Natural History Museum, Bulletin*. Chicago.
CS	*Ciba Symposium*. New York.
EP	*El Palacio*. Santa Fe.
ESAF-B	*Eastern States Archeological Federation, Bulletin*. Harrisburg.
FiA	*Fieldiana—Anthropology*. Chicago.
FlA	*Florida Anthropologist*. Gainesville.
GSA-MP	*Geological Survey of Alabama, Museum Paper*. Montgomery.
IHS-PRS	*Indiana Historical Society, Prehistory Research Series*. Indianapolis.
ISAS-J	*Illinois State Archaeological Society, Journal*. Champlain.
M	*Man*. London.
MARI-P	*Middle American Research Institute, Publications*. New Orleans.
MARR	*Middle American Research Records*. New Orleans: Tulane University.
Mas	*The Masterkey*. Los Angeles.
MAS-B	*Massachusetts Archaeological Society, Bulletin*. Attleboro.
ME	*Museum Echoes*. Columbus.
MiA	*The Minnesota Archaeologist*. Minneapolis.
MoA	*The Missouri Archaeologist*. Columbia.
MS	*Museum Service*. Rochester.
NYAS-T	*New York Academy of Sciences, Transactions*, Series 2. New York.
NYSAA-RT	*New York State Archaeological Association, Researches and Transactions*. Rochester.
OIRCS-B	*Ohio Indian Relic Collectors Society, Bulletin*. Columbus.
OSAHQ	*The Ohio State Archaeological and Historical Quarterly*. Columbus.
P	*Plateau*. Flagstaff.
PA	*Pennsylvania Archaeologist*. Philadelphia.
PAC-NL	*Plains Archaeological Conference, News Letter*. Lincoln.
PAS-B	*Philadelphia Anthropological Society, Bulletin*. Philadelphia.
PMAAE-P	*Peabody Museum of American Archaeology and Ethnology, Papers*. Cambridge.
PRI	*Puerto Rico Ilustrado*. San Juan.
RMEA	*Revista Mexicana de Estudios Antropológicos*. Mexico City.
RSPFA-P	*Robert S. Peabody Foundation for Archaeology, Papers*. Andover.
S	*Science*.
SA	*Scientific American*. New York.
SCN-M	*Sociedad de Ciencias Naturales, Memorias*. Caracas, Venezuela.
SGH-A	*Sociedad de Geografía e Historia, Anales*. Guatemala, C. A.
SIS	*Southern Indian Studies*. Chapel Hill.
SJA	*Southwestern Journal of Anthropology*. Albuquerque.
SL	*Southwestern Lore*. Gunnison, Colo.
SMC	*Smithsonian Miscellaneous Collections*. Washington.
TA	*Tennessee Archaeologist*. Knoxville.
TAPS-B	*Texas Archeological and Paleontological Society, Bulletin*. Abilene, Lubbock.
UKRA	*University of Kentucky Reports in Anthropology*. Lexington.
USD-MN	*University of South Dakota, Museum News*. Vermillion.
UWO-BM	*The University of Western Ontario, Bulletin of the Museums*. London, Ont.
VFPA	*Viking Fund Publications in Anthropology*. New York.
WAS-J	*Washington Academy of Sciences, Journal*. Washington.
WVA	*West Virginia Archaeologist*. West Virginia.

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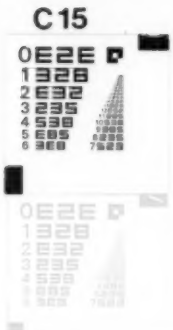
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